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New Mathematical Series

MODERN
MENTAL ARITHMETIC

BY

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INTRODUCTION

THIS book consists of two parts. Part I is designed for grades five and six of the Public Schools, and Part II for grades seven and eight. The exercises in both parts are so arranged that they can be readily adapted to any syllabus.

One of the purposes of teaching Arithmetic is to impart power to deal with the many applications of this subject which, in the course of a few years, the pupil will meet in the business of life. At times the subject is taught as though it were assumed the pupil would always have a pad or a work-book with him whenever it might be necessary for him to make a simple calculation. Is this fair to the pupil, who should develop the habit of cultivating clear conceptions, of going straight to the heart of the problem, and of concentrating his mind upon a subject? This habit can be formed only when the pupil must *put forth effort* in solving problems without resorting to ciphering.

No solutions are given, as it is desirable that the pupil should have the fullest scope for exercising his ingenuity and judgment in reaching a solution. The examples have, however, at times, been so arranged as to suggest the proper steps to be followed.

Space does not permit of many repetitions of the same kind of examples, but each can be taken as a model for many *original* examples to be *dictated* by the teacher.

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MENTAL ARITHMETIC

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ADDITION

EXERCISE 1

1. Add each of the following numbers to each of the numbers given in the rows marked (*a*), (*b*), (*c*), (*d*):

	4,	7,	9,	5,	8	
(*a*)	7	27	67	37	87	57
(*b*)	5	45	25	15	85	65
(*c*)	9	39	19	49	79	29
(*d*)	6	56	36	26	66	86

2. How many are 37 and 3? 57 and 23? 67 and 33? 47 and 33?

3. How many are 48 and 20? 56 and 30? 47 and 40?

4. Find the sum of 36, 20 and 8; of 36 and 28; of 56, 30 and 8; of 56 and 38.

5. Find the sum of 45 and 37; of 54 and 38; of 28 and 49.

6. A room is 12 feet long and 10 feet wide. How far is it round the four walls of the room?

7. A man sold a book for 16 cents which was 9 cents less than it cost. Find the cost.

8. In one sugar bush a farmer tapped 84 maple trees and in another 78. How many trees did he tap altogether?

9. John hoed 24 rows of turnips in one day and James 27 rows. How many rows did they hoe altogether?

10. There are 31 days in January and 28 days in February. How many days are there in the two months combined?

EXERCISE 2

1. Count by 4's from 4 to 36; from 9 to 41; from 3 to 31.

2. Count by 6's from 6 to 42; from 4 to 40; from 1 to 37.

3. How many are $12+6+3$?

4. The sides of a triangular board are 8 inches, 10 inches and 14 inches long. How long is a string that reaches round the board?

5. A man worked 20 days in July, 22 in August, and 24 in September. How many days did he work during these three months?

6. How many are 6, 7, 9, and 5? 5, 7, 8, and 6? 8, 5, 7, and 8?

7. A rose bush has 57 roses on it and another has 48. How many roses are there on both bushes?

8. A farmer sold 36 pounds of butter to one man and 45 pounds to another. How many pounds did he sell to both?

9. A bushel of wheat weighs 60 pounds and a bushel of oats 34 pounds. Find the weight of a bushel of wheat and a bushel of oats together.

10. A field is 40 rods long and 30 rods wide. How far is it round the field?

EXERCISE 3

1. Count by 8's from 4 to 52.

2. Half an hour ago it was 10 minutes past four. What time is it now?

3. A bicycle rider went 11 miles the first hour, 9 the second, and 12 the third. How far did he go altogether in the three hours?

4. A farmer has 24 horses, 36 cows and 110 sheep. How many animals has he?

5. One fish weighed 10 pounds, another 14 pounds, and a third 8 pounds. How much did they all weigh?

6. The addends are 7, 8, 9, and 5. Find the sum.

7. A farmer has 54 acres in crop, 36 acres in pasture, and 20 acres in forest. How many acres are there in the farm?

8. How many are 14 and 13? 24 and 23? 34 and 33? 54 and 43?

9. A father divided a number of apples between his two sons. He gave the younger 14 and the elder 4 more than this. How many apples did he divide?

10. John hoed 23 rows of potatoes, James 32 rows, and Frank 36 rows. How many rows were hoed?

EXERCISE 4

1. How many are $73+27+3+7+20$?

2. A bushel of wheat weighs 60 pounds, a bushel of oats 34 pounds, a bushel of barley 48 pounds. Find the weight of a mixture consisting of a bushel of wheat, a bushel of oats, and a bushel of barley.

3. A farmer sold 25 sheep to one man, 16 to another, and had 42 left. How many had he at first?

4. My father is 5 years older than my mother. They were married 4 years ago, when my mother was 22. What is the sum of their ages now?

5. A merchant deposited in a bank 20 dollars more on Tuesday than on Monday. Monday's deposit being $64, what was the amount of both deposits?

6. Mr. Smith, whose farm consists of 112 acres, buys an adjoining farm that contains 10 acres more than his own. How many acres has he after the purchase?

7. Count by 8's from 5 to 61 and by 7's from 2 to 65.

8. A man started on a journey. The first day he went 15 miles, the second day 6 miles more than this, and the third day 4 miles more than on the second day. How far did he travel during the three days?

9. My book-case has four shelves. On the first shelf there are 21 books, on the second 16, on the third 24, and on the fourth 15. How many books are there in the book-case?

10. A box is 34 inches long and 21 inches wide. How far is it round the top of the box?

11. How many hours are there from 12 noon on Monday to 3 in the afternoon of Wednesday?

12. After Mr. Adams had sold 68 bushels of oats to one man and 64 to another, he had 75 bushels left. How many bushels had he at first?

13. A man travelled 53 miles by rail, 45 miles by boat, and 17 miles by stage. How far did he travel?

14. A horse cost $36 more than a cow. How much did both cost, if $58 was paid for the cow?

SUBTRACTION

EXERCISE 5

1. From each of the numbers 15, 13, 17, 11, 16, subtract 8.

2. From each of the numbers 10, 8, 13, 11, 7, subtract 4.

3. From each of the numbers 20, 18, 13, 12, 15, subtract 9.

4. How much is 18 more than 10? 38 more than 10? 58 more than 10?

5. How much is 47 more than 20? 83 more than 50?

6. Take 20 + 7 from 52; take 27 from 52.

7. Take 24 from 48; 36 from 54; 48 from 63.

8. If a boy had 24 cents more, he would have 42 cents. How much has he?

9. A farmer had 33 turkeys and sold 19 of them. How many had he left?

10. A bushel of wheat is worth 86 cents and a bushel of barley 58 cents. How much more is a bushel of wheat worth than one of barley?

EXERCISE 6

1. At noon on July 1st the thermometer stood at 85 degrees and at midnight at 57 degrees. How many degrees had it fallen?

2. In an orchard there are 100 trees, of which 72 are apple trees. The rest are pear trees. How many pear trees are there?

3. A farmer bought a horse for 95 dollars and a cow for 37 dollars. How much more did he pay for the horse than for the cow?

4. What number must be added to the sum of 3, 5, and 8 to make 24?

5. A man engaged to work for 26 days, but left at the end of 14 days. How many more days should he have worked?

6. Subtract by 7's from 46 back to 4; from 51 back to 2.

7. Sold a cow for 42 dollars, which was 7 dollars more than it cost me. How much did it cost?

8. Forty-six, and twelve, and five, less thirty is how many?

9. A man is 42 years old; his wife is 36 years old. How much older is the man than his wife?

10. A train has gone 100 miles in three hours. It went 32 miles the first hour and 33 miles the second. How far did it go the third hour?

EXERCISE 7

1. A fisherman caught 52 fish; some bass and the rest pike. He caught 36 bass. How many pike did he catch?

2. The subtrahend is 14 and the remainder is 12. Find the minuend.

3. In a class of 33 boys and girls, there are 18 girls. How many boys are there?

4. A bushel of wheat weighs 60 pounds and a bushel of oats 34 pounds. How much heavier is a bushel of wheat than a bushel of oats?

5. Count back by 6's from 36 to 0.

6. Count back by 4's from 38 to 2.

7. Find a number equal to $18 + 15 - 17$.

8. A farmer had 45 cows and sold 20 of them. How many would he have to buy to have 36?

9. A horse and a buggy together cost $110. If the horse cost $65, how much did the buggy cost?

10. The difference of two numbers is 24. The smaller number is 28. Find the larger number.

11. The difference of two numbers is 16. The larger number is 50. Find the smaller number.

EXERCISE 8

1. Count by 3's from 2 to 35 and back again to 2.

2. How many hours does a boy attend school during a week, if he is there all the time?

3. George spent 15 cents for candy, and 21 cents for fruit. How much more would he have to spend to make 50 cents?

4. A barrel of pork weighs 200 pounds and a barrel of flour 196 pounds. How much heavier is a barrel of pork than a barrel of flour?

5. By how much does the sum of 12 and 5 exceed their difference?

6. The sum of three numbers is 36. The first is 13 and the second 15. Find the third.

7. A man who has $25 earns $34 more and then spends $16. How much money has he now?

8. Mary was born 4 years before Jane. Mary is now 22 years old. How old is Jane?

9. A room is 8 feet longer than wide. It is 30 feet long. Find the distance round its four walls.

10. From Winnipeg to Brandon is 133 miles, and from Winnipeg to Portage la Prairie 55 miles. How far is it from Brandon to Portage la Prairie?

EXERCISE 9

1. Find the value of $23+12-9$; of $17-8+9$; of $9+7-12$.

2. How many are $6+8+5-10$? $5+7+8-12$?

3. How much change should I get from a dollar bill after buying a book for 27 cents and a penholder for 7 cents?

4. Count by 7 from 7 to 49 and back again to 7.

5. The sum of three numbers is 30; two of them are 8 and 13. Find the third.

6. A farmer sold 8 sheep, then bought 12 and he had then 23. How many had he at first?

7. If a garden rake costs 40 cents, a hoe 25 cents, and a spade 55 cents, find the cost of the three together.

8. The sum of the ages of a man and his wife is 63 years. The wife is 28 years old. How old is the husband?

9. In two fields there are altogether 76 sheep. There are 34 in the first field. How many more sheep are there in the second field than in the first?

10. The sum of five numbers is 100; the sum of four of them is 82. Find the fifth number.

EXERCISE 10

1. A roll of carpet contained 84 yards, but 36 yards were sold from it. How many yards remained?

2. From 92 take 47 and from 62 take 27.

3. The sum of three numbers is 95; two of the numbers are 27 and 38. Find the third.

4. What number increased by the difference between 9 and 16 will make 35?

5. A man walked 84 miles in three days. The first day he went 18 miles and the second day 32. How far did he walk the third day?

6. Find the value of $7+8+9+6-14$.

7. James is now 21 years old. How old was he 12 years ago?

8. From 54 take the sum of 7, 5, 8, 4, and 13.

9. Out of $40, a man spent $16 at one time and $15 at another. How much remained?

10. A farmer has 80 acres to plough; 24 acres were ploughed the first week and 28 acres the second. How many acres are yet to be ploughed?

EXERCISE 11

1. A picture when framed was sold for $52. Without the frame the picture could have been bought for $36. How much did the frame cost?

2. A man bought two chairs for Christmas presents. For one he paid $45 and for the other $42. How much change did he get from 9 ten-dollar bills?

3. After paying for a picture that cost $48, how much money is left out of $100?

4. The top of a church spire is 200 feet from the ground. A man is painting the spire 158 feet from the ground. How far is he from the top of the spire?

5. From a box of oranges 415 were sold, and then there were 233 left. How many oranges were in the box at first?

6. There are 240 bushels in a bin of wheat. How much wheat remains in it after two loads of 64 bushels and 66 bushels respectively have been taken from it?

7. A tree 125 feet high is broken by a wind storm 47 feet from the ground. How long is the part broken off?

8. How much more money shall I need to buy a chair worth $60, if I have only $45?

9. How much is 59 - 9 greater than 36?

10. A cistern, which holds 100 gallons, was full in the morning, but at night there were only 25 gallons left. How many gallons had been drawn off during the day?

EXERCISE 12

1. Find the value of $25 + 46 - 30 - 12 + 13$.

2. Mary has two books; one has 125 pages and the other 184 pages. How many pages has one more than the other?

3. A drover bought 35 cattle, and then sold to one man 28, and to another 36, and had none left. How many cattle had he at first?

4. A person who has $48 in a bank deposits $70 more; next day he draws out $64. How much has he then in the bank?

5. A girl planted 136 seeds in her flower garden. Only 92 plants came up. How many seeds did not grow?

6. A lot has 60 feet frontage and 125 feet depth. How far is it round the outside of this lot?

7. The sum of the ages of A, B, and C is 40 years. A is 14 and B is 15. How old is C?

8. From his farm of 320 acres, a farmer sold 84 acres to one man and 66 acres to another. How many acres has he now left?

9. One boy threw a baseball 72 yards, another threw it 90 yards. How much farther did one throw the ball than the other?

EXERCISE 13

1. Simplify $18 + 17 - 20 + 16 + 14 - 40$.

2. From 100 take the sum of 16, 26, and 36.

3. Find the value of $62 + 13 - 25 + 22 - 36 + 14$.

4. Cecil wished to buy a ball for 75 cents and a bat for 40 cents. He saved 58 cents and his mother gave him the rest. How much did his mother give him?

5. A boat had 700 passengers and landed 175 at a port. How many remained on the boat?

6. Gladstone was born in 1809 and died at the age of 89. In what year did he die?

7. The University of Cambridge was founded in 915. How old was it in 1910?

8. A man was 21 years old in 1884. In what year will he be 75 years old?

9. What number added to 156 will give the sum of 84 and 168?

MULTIPLICATION

EXERCISE 14

1. Multiply each of the following numbers: 5, 7. 8, 3, 9, 6, by 8; by 5; by 8.

2. At 7 cents a yard, what will 8 yards of cloth cost?

3. Multiply 6, 5, 8, 7, 9, 5, 4, 0, each by 7; by 9.

4. At 30 cents a yard, how much will 8 yards of ribbon cost?

5. There are 12 inches in one foot. How many inches are there in 7 feet?

6. How much must be paid for 7 pounds of coffee at 30 cents a pound?

7. A man worked for 5 months at $40 a month. How much did he earn?

8. A man works 10 hours a day for 2 weeks (12 days). How many hours does he work?

9. How much money will a street-car conductor collect from 16 passengers, if the fare is 5 cents?

10. What is the cost of 6 tons of hay at $18 a ton?

11. Multiply 80 by 4 60 by 5 40 by 8
" 83 by 4 64 by 5 46 by 8

EXERCISE 15

1. Find the sum of 5×7 and 3×7.

2. Simplify $7 \times 9 + 3 \times 9$.

3. A bushel of wheat weighs 60 pounds. Find the weight of 9 bushels of wheat.

4 A bushel of flax weighs 50 pounds. Find the weight of 5 bushels of wheat and 7 bushels of flax.

5. George has 12 marbles and Frank has three times as many, less 4. How many has Frank?

6. A music teacher gives 7 lessons a day at $2 a lesson. How much does he earn in 6 days?

7. How many words are there in a page of 32 lines that average 9 words to a line?

8. Find the cost of a turkey weighing 17 pounds at 22 cents per pound.

9. A woman bought 2 loaves of bread at 8 cents a loaf, and 4 quarts of milk at 8 cents a quart. How much change did she get back out of a dollar bill?

10. At 3 cents apiece, how much will 4 dozen oranges cost?

EXERCISE 16

1. How many inches are there in 8 feet? in 8 feet 4 inches?

2. How many hours are there in 3 days? in 3 days 8 hours?

3. Find the product of the sum and the difference of 9 and 5.

4. Multiply 9, 5, 8, 0, 7, 4 each by 7.

5. If a farmer sows 2 bushels of wheat on an acre, how much will he sow on 18 acres?

6. How much is 4 bushels of wheat heavier than 5 bushels of oats?

7. From one hive a farmer got 32 pounds of honey, and from another 48 pounds. He sold it all at 25 cents a pound. How much did he get for it?

8. How much more is 8 times 8 than 7 times 9?

9. Find first the sum, then the difference, and then the product of 9 and 16.

10. Eight times nine, plus twelve, less twenty, are how many?

EXERCISE 17

1. A man has 65 miles to go. He drives for 7 hours at 8 miles an hour. How far has he yet to go?

2. Find the total cost of 4 pounds of sugar at 6 cents a pound, and 5 boxes of berries at 9 cents a box.

3. How much can a man earn in 20 days working 8 hours a day, at 40 cents an hour?

4. How much is 9 times 8 larger than 4 times 12?

5. A farmer has wheat in 4 bins. If there are 60 bushels in each bin, what is the whole worth at 90 cents a bushel?

6. For how much must 5 cows, which cost 30 dollars each, be sold to gain 20 dollars?

7. A boy earns 80 cents a day and spends 50 cents a day. How much money will he have after working 12 days?

8. Simplify $9 \times 7 - 3 \times 12 + 4 \times 5$.

9. Two men are 50 miles apart. They start to walk towards each other at the same time, one at the rate of 3 miles and the other at the rate of 4 miles an hour. How far will they be apart at the end of 5 hours?

10. If a plough is worth 3 cords of wood, how much wood will 14 ploughs cost?

EXERCISE 18

1. Multiply each of the numbers: 14, 18, 23, 54 by 3; by 5; by 7; by 4; by 8.

2. Five times twenty less twenty-five are how many?

3. How many times 9 are 3 times 9 and 5 times 9?

4. At $7 a ton, find the cost of the coal to heat a house for 6 months, if 2 tons last a month.

5. A farmer had 80 acres in wheat and the average yield was 23 bushels an acre. How much wheat did he raise?

6. There are 1760 yards in a mile. How many yards are there in 5 miles?

7. *A* and *B*, travelling toward each other, meet in 5 hours. How far apart were their starting points, if *A* went 6 miles an hour and *B* 5?

8. If a quantity of provisions will supply 9 men for 8 days, how long will it supply 1 man?

9. If a man earns $60 in 5 weeks, and pays out of his earnings $3 a week for board, how much will he have left?

10. In an orchard there are 10 rows of trees and 12 trees in each row. If the average yield is 3 bushels per tree, how many bushels does the orchard bear?

11. A man drives for three days at the rate of 8 miles per hour. The first day he drives 5 hours, the second 7, and the third 9. How far does he drive in all?

12. One cask contains 75 gallons of vinegar, and another 58 gallons. It is sold for 60 cents a gallon. How much more is received for the first cask than for the second?

DIVISION

EXERCISE 19

1. How many lead pencils at 4 cents each can be bought for 12 cents?

2. John paid 32 dollars for 8 cords of wood. How much is that a cord?

3. A boy rode 28 miles on a bicycle in 4 hours. How much is that an hour?

4. If $63 is paid for 7 tons of hay, what is the price per ton?

5. At $8 per barrel, how many barrels of flour can I buy for $72?

6. In 8 feet there are 96 inches. How many inches are there in one foot?

7. Thirty-six is how many times 4? 9? 6? 12?

8. If a man pays 35 cents for 7 pounds of nails, how much are nails a pound?

9. In an orchard there are 56 trees, standing in 8 equal rows. How many trees are there in each row?

10. If you have 63 dollars, how many sheep can you buy at 5 dollars each, and how many dollars would you have left?

EXERCISE 20

1. Eighty-eight is how many times 4? 8? 11?

2. How many cords of wood can be bought for $75 at $5 a cord?

3. When a man having $51 can buy 6 pigs and have $3 left, what is the cost of each pig?

4. How much are oranges apiece, when 12 cost 48 cents?

5. How many yards of muslin at 5 cents a yard can be bought for $8?

6. Jane buys 12 yards of ribbon at 12 cents a yard and receives 6 cents change. How much money does she give the merchant?

7. If 4 pounds of butter at 26 cents a pound and 5 dozen eggs together cost $2.29, how much do eggs cost a dozen?

8. A woman sold 12 dozen eggs at 20 cents a dozen, and with the proceeds bought 15 pounds of raisins. How much did the raisins cost a pound?

9. The divisor is 5, the remainder 3, and the quotient 7. Find the dividend.

10. A farmer bought an equal number of pigs and sheep for $96. Each pig cost $5 and each sheep $7. How many of each kind did he buy?

EXERCISE 21

1. How many times $5+4$ is 63? is 45?

2. How many times can $2+5$ be taken from 21? from 35? from 63?

3. Simplify $63 \div (6+3-2)$.

4. What is one-half of 84? of 38? of 54?

5. A man who had 21 cows bought 15 more. If they are pasturing in 3 fields and the same number in each field, how many are there in a field?

6. How many oranges at 4 cents each will pay for 8 bananas at 3 cents each?

7. At 6 cents a pound, how many pounds of sugar can be bought for 8 dozen eggs at 24 cents a dozen?

8. Three times 8 are how many times 6? 4? 12?

9. A farmer received 10 tons of coal for 8 loads of hay worth $9 a load. How much did the coal cost per ton?

10. If 3 pounds of butter cost 60 cents, find the cost of 5 pounds.

EXERCISE 22

1. If 4 barrels of apples cost $8, find the cost of 6 barrels at the same rate.

2. Find the cost of 8 quarts of milk, if 5 quarts cost 40 cents.

3. If 9 yards of cloth cost 45 cents, find the cost of 7 yards.

4. If 10 cents will buy 2 pencils, how much will 17 pencils cost?

5. How much will 30 barrels of flour cost when 5 barrels cost $30?

6. If 8 copy-books cost 16 cents, find the cost of the copy-books for a class of 20 pupils.

7. There are 36 inches in 3 feet. How many inches are there in 8 feet?

8. A stenographer earns $90 in 10 weeks. How much does she earn at the same rate in 7 weeks?

9. Find the cost of board for 7 weeks, if it costs $36 for 9 weeks.

10. If 7 cords of wood can be bought for $28, how many cords can be bought for $72?

EXERCISE 23

1. When 7 is multiplied by a certain number the product is 210. Find the number.

2. If 5 bags of coal weigh 525 pounds, how much does one bag of coal weigh?

3. When flour is worth $6 a barrel, how many barrels can be bought for $426?

4. The dividend is 88; the remainder is 4; and the quotient is 7. Find the divisor.

5. Simplify $(18+17+37)\div 8$.

6. The product of three numbers is 140 and the product of two of them is 28. Find the third number.

7. Find the product of the sum and difference of 21 and 15.

8. There are 16 ounces in a pound. How many ounces are there in 11 pounds?

9. What number besides 7 is contained an exact number of times in 91?

10. What number divided by 8 will give a quotient of 13 and a remainder of 7?

EXERCISE 24

1. Multiply 8, 6, 7, 81, 67, 78 each by 10.

2. (*a*) Multiply each of the following numbers by 10 and divide the product by 2: 6, 8, 11, 14, 16, 25.

(*b*) Multiply each of the numbers:

6, 8, 11, 14, 16, 25 by 5.

(*c*) Compare the results obtained in (*a*) and (*b*) and state how a number may be multiplied by 5.

3. What number subtracted 3 times from 22 leaves 4 for remainder?

4. If a boat sails 8 miles an hour, how far will it go in 7 hours?

5. Multiply each of the following numbers by 5:

18, 24, 36, 42, 45, and 51.

6. From 7 times 9 take 3 times 8, and add 15 to the remainder.

7. Simplify $18 \div 6 \times 7 + 9 + 5$.

8. Find what pairs of numbers multiplied together will produce 24; 36; 42.

9. The product of two numbers is 91; one of the numbers is 7. Find the other.

10. A certain number when multiplied by itself gives as product 64. Find the number.

EXERCISE 25

1. Name a factor common to 15 and 25; to 30 and 36.

2. Square 7, subtract 9 from the result and divide the remainder by 8. What is the quotient?

3. From the square of 9 subtract the square of 7, and divide the remainder by 4. What is the quotient?

4. A certain number divided by either 8 or 9 gives a remainder 5 in each case. Find the least number.

5. The remainder is 5, the quotient 7, and the divisor 8. Find the dividend.

6. When $63 is paid for 9 barrels of flour, how many barrels can be bought for $112?

7. What is the cost of board for 7 weeks, if the cost of board for 9 weeks is $36?

8. When 7 quarts of gooseberries cost 56 cents, how much will 9 quarts cost?

9. When a man, having $30, can buy 7 cords of wood and have $2 left, what is the cost of a cord?

10. By what number must 9 be multiplied to give the same product as 12 times 15?

EXERCISE 26

1. If 4 pounds of coffee cost 120 cents, what will 7 pounds cost?

2. Find the average of 7, 3, 5, and 9.

3. Find the cost of 15 cords of wood, when 4 cords cost $24

4. How many yards of cloth at 6 cents a yard are equal in value to 10 dozen eggs at 21 cents a dozen?

5. The sum of 14 and 5 times a certain number is 54. Find the number.

6. The quotient is 9, the remainder is 4, and the dividend is 58. Find the divisor.

7. Find the smallest number that, added to 93, will make the sum exactly divisible by 7.

8. Of what number is 15 both divisor and quotient?

9. There are 160 acres in a quarter section of land. How many acres does a man own who has 5 quarter sections?

10. When a certain number is multiplied by 7 the result is 917. Find the number.

EXERCISE 27

1. Divide 52 marbles equally among 4 boys.

2. A newsboy bought papers at [illegible]t each and sold them at 3 cents each. How [illegible] did he make on 4 dozen papers?

3. The total cost of a hat to a milliner was $8.75. At what price must she sell it to gain $5.25?

4. Find the cost of 3 dozen oranges at 4 cents each.

5. Find the cost of 2 dozen lemons at 2 for 5 cents.

6. If 2 thousand feet of lumber cost $72, how much will 7 thousand feet cost?

7. If a man receives 18 pounds of tea in exchange for 36 pounds of cheese at 20 cents a pound, what is the price of tea per pound?

8. A farmer received 30 yards of tweed for 5 tons of hay at $12 a ton. What was the cloth worth a yard?

9. Find the least number that must be added to 82 so that the sum may be exactly divisible by 7.

EXERCISE 28

1. If a man can do a piece of work in 12 days, in what time can 2 men do it? 3 men? 4 men?

2. If 8 men can do a work in 5 days, in what time can 10 men do it?

3. How many men will be required to do as much work in 3 days as 7 men can do in 6 days?

4. If 40 horses cost $5000, what was the average cost per head?

5. At 30 cents a pound, how many pounds of coffee can be bought for $18?

6. If 20 pounds of sugar are exchanged for 4 dozen of eggs, how many pounds of sugar are 28 dozen eggs worth?

7. A dairyman buys milk at 5 cents a quart and retails it at 9 cents a quart. His profit for a week is $32. How much milk does he sell?

8. A man goes 75 miles in his automobile in 5 hours. At this rate how far can he go in 7 hours?

9. A baker uses 20 tons of coal every 3 months. How much does he pay for coal a year at $5 a ton?

EXERCISE 29

1. Nine times 8 are how many times $24 \div 6$?

2. Divide 16×4 by 8×2.

3. Divide 27×12 by 9×6.

4. A yard of calico is worth 9 cents. How many yards can be got for 6 dozen eggs at 18 cents a dozen?

5. Find the cost of 2 pair of chickens at 75 cents a pair, and 3 pair of ducks at 80 cents a pair?

6. Bought some rice for 65 cents, some sugar for 45 cents, and some tea for $1. How much change should I get from a five-dollar bill?

7. If I buy 17 pounds of sugar at 5 cents a pound, how many oranges at 5 cents each can I buy with the change from a dollar bill?

8. How much butter at 20 cents a pound must be given for 5 yards of calico at 16 cents a yard?

9. An orchard contains 8 rows of trees, and each row has 12 trees. If the same number of trees were arranged in 6 equal rows, how many trees would each row contain?

SIMPLE FRACTIONS

EXERCISE 30

1. Find $\frac{1}{3}$ of \$12; of \$18; of \$30.
2. Find $\frac{2}{3}$ of \$12; of \$18; of \$24.
3. How much is $\frac{1}{2}$ of 18 bushels greater than $\frac{1}{3}$ of 18 bushels?
4. How many are 5 times $\frac{1}{5}$ of 15 pens?
5. To $\frac{1}{2}$ of 18 add $\frac{2}{3}$ of 12.
6. Find the sum of $\frac{2}{3}$ of 15 and $\frac{1}{4}$ of 20.
7. How much is $\frac{3}{8}$ of a line 16 inches long shorter than $\frac{3}{4}$ of the same line?
8. How many thirds are there in 4? in $4\frac{2}{3}$?
9. How many fourths are there in 3? in $3\frac{3}{4}$?
10. Twelve is $\frac{1}{3}$ of what number?

EXERCISE 31

1. How many dollars are there in 4 half-dollars?
2. How many feet are there in $\frac{6}{3}$ feet?
3. How many ones in $\frac{16}{8}$? in $\frac{20}{4}$?
4. Change $3\frac{1}{3}$ to thirds and $4\frac{3}{4}$ to quarters.
5. How many quarters are there in $2\frac{1}{2}$? in 3?
6. How many thirds are there in each of the following:

   3, $3\frac{1}{3}$, 4, $4\frac{2}{3}$, 5, $5\frac{2}{3}$?

7. Find the sum of $\frac{1}{4}$, $\frac{3}{4}$, $1\frac{1}{4}$, and $2\frac{3}{4}$.
8. From $2\frac{3}{4}$, take $1\frac{1}{4}$ and from $5\frac{2}{3}$ take $2\frac{1}{3}$.
9. Find 3 times $\frac{2}{3}$ and 4 times $\frac{3}{4}$.
10. Find how often $\frac{3}{4}$ is contained in 6; in $3\frac{3}{4}$.

EXERCISE 32

1. If Mary pays 15 cents for $1\frac{1}{2}$ yards of ribbon, how much does she pay for $\frac{1}{2}$ of a yard? How much for a whole yard?

2. If $\frac{2}{3}$ of a journey is 10 miles, how far is $\frac{1}{3}$ of the journey? The whole journey?

3. When $2\frac{2}{3}$ yards of cloth cost $16, find the cost of $\frac{1}{3}$ of a yard; of one yard.

4. When $1\frac{1}{4}$ pounds of cheese cost 25 cents, how much does $\frac{1}{4}$ of a pound cost? One pound?

5. Add together $\frac{1}{4}$ of 8, $\frac{1}{3}$ of 12, and $\frac{2}{5}$ of 15.

6. Find $\frac{3}{4}$ of each of the following: 8, 12, 16, 20.

7. How many fifths are there in each of the following: 1, $2\frac{1}{5}$, 3, $3\frac{3}{5}$, $4\frac{4}{5}$?

8. If $\frac{2}{3}$ of a farm has 60 acres in it, how many acres are there in the whole farm?

9. John has 20 marbles and James $\frac{3}{4}$ as many. How many has James?

10. How much must be paid for $\frac{2}{3}$ of a ton of hay at $15 a ton?

EXERCISE 33

1. One-third of a number is 4; find the number.

2. Three-fifths of a number is 9; find the number.

3. Five is $\frac{1}{4}$ of what number?

4. To $\frac{3}{4}$ of 8 add $\frac{2}{3}$ of 9.

5. How much is $\frac{1}{2}$ of 20 greater than $\frac{3}{4}$ of 12?

6. A merchant sold $\frac{1}{3}$ of a piece of cloth containing 45 yards. How many yards did he sell?

7. Change $\frac{1}{2}$ to quarters and $\frac{1}{3}$ to sixths.

8. Change $\frac{2}{3}$ to sixths and $\frac{3}{4}$ to eighths.

9. How many tenths are there in $\frac{1}{5}$? in $\frac{3}{5}$?

10. Change $\frac{9}{12}$ to quarters and $\frac{2}{3}$ to thirds.

11. From $\frac{2}{3}$ of 15 take $\frac{3}{4}$ of 8.

12. Add together $\frac{1}{4}$ of \$20 and $\frac{2}{5}$ of 25.

EXERCISE 34

1. Find $\frac{1}{2}$ of \$12 and compare it with $\frac{1}{3}$ of \$12.

2. How many inches are there in each of the following fractions of a foot: $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{2}{3}$?

3. Of what number is 11 one-half?

4. Find the number of fourths in $9\frac{3}{4}$.

5. From $\frac{2}{3}$ of 36 take $\frac{3}{4}$ of 24.

6. How many units are there in 15 thirds and 24 fourths taken together?

7. After selling $\frac{3}{5}$ of his land, a farmer has 80 acres left. How many acres had he before the sale?

8. Thirty-six is three-fifths of a number; find it.

9. Find the difference in length between $\frac{5}{8}$ of a foot and $\frac{2}{3}$ of a foot.

10. Add together $\frac{3}{4}$ of 16 and $\frac{4}{5}$ of 30.

11. How many more inches are there in $\frac{3}{4}$ of a yard than in $\frac{5}{6}$ of a foot?

12. *A* has to make a journey of 120 miles. After he has completed $\frac{3}{5}$ of the journey, how long will it take him to walk the rest of the way at the rate of 4 miles an hour?

MISCELLANEOUS EXERCISES

EXERCISE 35

1. John has twice as much money as James ; together they have 36 cents. How much has each ?

2. At 25 cents a yard, how many yards of cloth can be bought for 15 pounds of butter at 20 cents a pound ?

3. Multiply 30 by 5, subtract 75, add 15, and divide the sum by 3. What is the result ?

4. Find the cost of sending a telegram of 19 words at 25 cents for ten words and 1 cent for each additional word.

5. The sum of the product of two numbers and 7 is 25 ; one of the numbers being 3, find the other.

6. Find the average of 8, 7, 9, 2, and 4.

7. The average of four numbers is 12 ; three of them are 6, 10, and 15. Find the fourth.

8. The average weight of 5 fish was 7 pounds. Find their aggregate weight.

9. A bushel of rye weighs 56 pounds and a bushel of wheat 60 pounds. How much more do 5 bushels of wheat weigh than 5 bushels of rye ?

10. Find the value of ten dozen eggs at the rate of 3 eggs for 5 cents.

EXERCISE 36

1. How many 5-cent pieces are there in 6 quarters and 2 ten-cent pieces ?

2. Find the price of $2\frac{1}{2}$ yards of cloth at 60 cents a yard.

3. Two girls have together 47 buttons ; one has 9 more than the other. How many has each ?

4. If $\frac{1}{3}$ of the sum of two numbers is 28 and one of them is 46, what is the other number?

5. Two-thirds of a certain number is 32. Find the number.

6. Mary's age is $\frac{1}{3}$ of her mother's, who is now 36. Find the sum of their ages.

7. A lady bought a certain number of yards of lace at 10 cents a yard. If she had paid 15 cents a yard, the cost would be 60 cents more. How many yards did she buy?

8. In a division question the remainder is 7. The divisor is 2 times and the quotient 3 times the remainder. Find the dividend.

9. If 20 bushels of wheat make 5 barrels of flour worth $8 a barrel, what is the value of the flour made from 50 bushels of wheat?

EXERCISE 37

1. Find the cost of fencing a lot 24 yards by 30 yards at 80 cents a yard.

2. Divide 96 cents between Mary and James so that James may have 16 cents less than Mary.

3. Simplify $72 \div 6 \times 3 + 49$.

4. From 7 times 9 take 8 times 7, and add 47 to the remainder.

5. A grocer buys potatoes at 50 cents a bushel and retails them at 90 cents a bushel. How many bushels does he sell to make $30?

6. A man walked into the country $4\frac{1}{2}$ hours at the rate of 4 miles an hour and returned at the rate of 3 miles an hour. How many hours was he in returning?

7. What number subtracted 4 times from 267 leaves 3 for remainder?

8. Find the cost of plastering a wall containing 112 square yards at 75 cents a square yard.

9. If I had $18 more I could pay for 12 sheep at $6 a head, but I spent my money in buying hay at $9 a ton. How much hay did I buy?

EXERCISE 38

1. Divide $46 between J and R, giving J $16 more than R.

2. The perimeter of a rectangular lot is 250 feet and the length is 75 feet more than the width. Find the width.

3. A, B, and C together weigh 230 pounds. A and B each weigh 10 pounds more than C. Find the weight of each.

4. Divide 92 cents among R, T, and W, giving T 6 cents more than R, and W 8 cents more than T.

5. Three fields contain 108 acres. The first is three times as large as the second, which is twice as large as the third. Find the area of each.

6. Jack has $1.20 made up of an equal number of 5-cent and 10-cent pieces. How many has he of each?

7. On a collection plate, containing $25 in 10-cent and 5-cent pieces, there were twice as many 10-cent pieces as 5-cent pieces. How many were there of each?

8. Divide 84 cents among J, R, and S, giving J 6 cents and R 4 cents for every 2 cents S will receive.

9. 35 oranges were divided among 3 boys and 2 girls, each girl receiving twice as many as each boy. How many did each boy receive?

DENOMINATE NUMBERS

EXERCISE 39

1. How many inches are there in 2 feet 8 inches? In 3 feet 4 inches? In 1 yard?

2. How many feet are there in 36 inches? In 60 inches? In 96 inches?

3. How many inches are there in 1 yard 2 feet 6 inches?

4. Change 84 inches to yards and feet.

5. What will it cost to dig a ditch a mile long at $5.50 a rod?

6. The average depth of a lake is 16 fathoms. How deep is the lake in feet?

7. In walking, a boy steps 2 feet 3 inches, and takes 120 steps in a minute. How far does he go in a minute?

8. How many steps, each 2 feet long, will a girl take in going 100 yards?

9. How many more feet are there in 15 yards 2 feet than in 372 inches?

10. The wheel of a bicycle is 3 feet 6 inches in circumference. How far will a boy have gone when the wheel has turned 30 times?

EXERCISE 40

1. Find the area of a slate 10 inches long and $7\frac{1}{2}$ inches wide.

2. How many square inches are there in 2 square feet 16 square inches?

3. How many square feet are there in 12 square yards 5 square feet?

4. Change 89 square feet to square yards.

5. How much will it cost to plaster a ceiling 15 feet wide and 18 feet long, at 25 cents a square yard?

6. At 20 cents a square foot, find the price of a sheet of plate glass 10 feet long and 8 feet wide.

7. How many square feet are there in 4 boards each 10 inches wide and 12 feet long?

8. What is the difference in area between 4 square feet and a surface 4 feet square?

9. If a man goes 1 rod in 5 steps, how many steps will he take in going a mile?

10. The blackboard is 16 feet long and $4\frac{1}{2}$ feet wide. How many square yards are there in it?

EXERCISE 41

How many pints of milk are there in 2 gallons?

2. Milk is selling at 8 cents a quart. How much will 3 quarts and 1 pint cost?

3. If 3 pints of molasses have been sold out of 2 gallons, how much remains?

4. Bought a pint of milk for 5 cents At what rate is that per gallon?

5. How many pint bottles will be required to hold 4 gallons 2 quarts of maple syrup?

6. How many times can a lamp holding $1\frac{1}{2}$ pints be filled from a can holding 1 gallon 2 quarts?

7. How much was received for 2 gallons 1 quart of cream at 20 cents a quart?

8. A milkman buys milk at the rate of 16 cents a gallon and sells it at 10 cents a quart. How much must he sell to gain $3?

9. Find the cost of 8 gallons of vinegar at 5 cents a pint.

10. If a gallon of alcohol sells for $2.40, how much must be paid for 3 quarts 1 pint?

EXERCISE 42

1. How many cubic feet are there in 3 cubic yards? In 2 cubic yards 10 cubic feet?

2. A pile of wood is 9 feet long, 4 feet wide, and 5 feet high. How many cubic feet are there in it?

3. How many cords are there in a pile of wood 16 feet long, 4 feet wide, and 8 feet high?

4. A stick of timber is 24 feet long and 2 feet square at each end. How many cubic feet are there in it?

5. What is the value of a block of granite 6 feet square and 4 feet high, at 50 cents a cubic foot?

6. A vat 20 feet long and 18 feet wide is full of water. How many cubic feet must be drawn off to sink the surface 5 feet?

7. A cellar 30 feet square has a capacity of 300 cubic yards. How deep is it?

8. How many cubic yards are there in a room 18 feet long, 15 feet wide, and 10 feet high?

9. A pile of wood contained 18 cords. From this pile 8 cords 60 cubic feet were taken. How much wood remained?

10. A rectangular cistern 6 feet by 8 feet has 240 cubic feet of water in it. How deep is the water?

EXERCISE 43

1. How many pounds of wheat are grown on an acre yielding 24 bushels?

2. At 90 cents a bushel, what is the value of the wheat grown on an acre, if the yield is 25 bushels?

3. At 80 cents a bushel, what is the value of a crop grown on 160 acres, if the yield averages 20 bushels per acre?

4. How many acres are there in a field 80 rods long and 40 rods wide?

5. Find the cost of ploughing a field 80 rods long and 40 rods wide, at $3 an acre.

6. If a man and team can seed 10 acres a day, how much will it cost to sow the field in example 5 at $3 per day?

7. The wheat sown on the field in example 5 cost $1.50 a bushel, and 2 bushels were sown to the acre. How much did the seed cost?

8. At 75 cents an acre, find the cost of cutting and stacking the crop on the field in example 5.

9. (*a*) The yield being 25 bushels an acre, find the cost of threshing the crop on the field in example 5 at 8 cents a bushel.

(*b*) Find the cost of hauling the wheat to market at $4\frac{1}{2}$ cents a bushel.

(*c*) How much was the crop sold for at 90 cents a bushel?

EXERCISE 44

1. How many ounces are there in 5 pounds 8 ounces Avoirdupois? Troy?

2. How many tons and hundredweights do 80 bushels of wheat weigh?

3. How many 4-ounce weights are equal in weight to a brass bar weighing 2 pounds 8 ounces?

4. From 25 pounds of cheese a grocer sold 8 pounds 7 ounces. How much remained unsold?

5. Find the price of 2 hundredweights and 25 pounds of cheese at 16 cents a pound.

6. How much is one-quarter of a hundredweight of salt worth at 4 cents a pound?

7. How much are 5 tons 500 pounds of coal worth at $8 a ton?

8. Five boys share equally 3 pounds 7 ounces of candy. How much does each receive?

9. If $3\frac{1}{2}$ pounds of beef cost 70 cents, find the cost of 2 pounds 4 ounces.

10. If 6 blocks of marble of equal size together weigh 3 tons 12 cwt., what is the weight of each?

EXERCISE 45

1. Find the number of days between March 20th and May 15th, both days included.

2. How many hours are there in a week?

3. How many minutes are there from 20 minutes to 10 to 15 minutes past 12?

4. How many minutes are there in a school day from 9 to 12 and from 1 to 4?

5. April 1st is on a Thursday; on what day of the week is May 10th of the same year?

6. How many weeks are there in an ordinary year?

7. If the year 1910 began on Saturday, on what day of the week will 1911 begin? 1912? 1913?

8. How many hours are there in the longest month?

9. The length of the day is equal to twice the time at which the sun sets. How long is the day when the sun sets at 15 minutes past 7?

10. The length of the night is equal to twice the time at which the sun rises. The sun rises at a certain place at 40 minutes past 6. How long is the night?

EXERCISE 46

1. During a storm $2\frac{1}{2}$ inches of rain fell. How many cubic inches fell upon a square foot?

2. If rain falls to a depth of 1 inch on the level, how many cubic inches will fall upon a lot 60 feet by 40 feet?

3. A bushel of potatoes contains about 45 pounds of water. How much will the water in 60 bushels weigh?

4. If an acre of potatoes yields 150 bushels, and they are sold at 90 cents a bag holding $1\frac{1}{2}$ bushels, how much is the acre of potatoes worth?

5. Find the value of 120 bushels of potatoes at 80 cents a bag of 90 pounds.

6. In a bushel of wheat there are 20 ounces of nitrogen. What is the weight of nitrogen taken from an acre of ground that produces a crop of 24 bushels of wheat?

7. A ton of clover hay has 40 pounds of nitrogen. Find the weight of nitrogen in a crop from 10 acres producing $3\frac{1}{2}$ tons per acre.

8. How many weeks are there in the months of September, October, and November?

9. A lot is 60 feet frontage by 90 feet depth. How much will it cost to put a fence round it at 80 cents a yard?

10. Potatoes bought at 60 cents a bushel are retailed at 25 cents a peck. How many bushels must be sold to gain $24?

EXERCISE 47

1. How many units are there in $7\frac{1}{2}$ dozen? in 3 score? in $4\frac{1}{2}$ score?

2. How many spools are there in 2 gross of spools?

3. How many dozen are there in 6 score?

4. How many sheets of paper are there in 1 ream? in 2 reams? in $3\frac{1}{4}$ reams?

5. I bought 170 pounds of oats. Find the cost at 50 cents a bushel.

6. Find the cost of $2\frac{1}{2}$ reams of foolscap at 15 cents a quire.

7. Find the cost of a gross of pens at 5 cents a dozen.

8. A stationer bought paper at $1.50 a ream and sold it at 20 cents a quire. How much did he gain per ream?

9. A stationer pays 50 cents per gross for pens and retails them at a cent apiece. How much does he gain per gross?

10. How many years old is a man whose age is 4 score and 5 years?

EXERCISE 48

1. When 90 cents is paid for carpet 27 inches wide, how much should be paid for carpet of the same quality 1 yard wide?

2. If a man earns 1 cent a minute, how much does he earn in a day of 8 hours?

3. How many thousand board feet are there in 100 boards each 16 feet long, 12 inches broad, and 1 inch thick?

4. Find the number of square feet in an oblong 2 yards 2 feet wide and 7 yards long.

5. Find the area of a pane of glass $37\frac{1}{2}$ inches long and 24 inches wide.

6. If a man goes 1 rod in 6 steps, how many steps will he take in going a mile?

7. A man who steps 30 inches at each step wishes to measure a distance of 90 yards. How many steps must he take?

8. Two fish together weighed 12 pounds 6 ounces, and one of them weighed 7 pounds 8 ounces. How much did the other weigh?

9. A storekeeper bought a barrel of pork at \$15 a hundredweight and sold it at 20 cents a pound. How much did he make?

10. What is the difference between a surface 6 yards square and one containing 6 square yards?

EXERCISE 49

1. How much will it cost to plaster a ceiling 18 feet square at 25 cents a square yard?

2. A five weeks' vacation ended on August 29th. When did it begin?

3. The area of a blackboard is 90 square feet and it is 4 feet high. How long is it?

4. Find the date 60 days after April 4th.

5. Find the cost of a ream of paper at 2 sheets for a cent.

6. A lot 10 rods long contains half an acre. How wide is the lot?

7. How many square feet are there in 3 boards, each 20 inches wide and 12 feet long?

8. If it costs $108 to excavate a cellar 6 yards square at $1 a cubic yard, how deep is the cellar?

9. A cubic foot of water weighs $62\frac{1}{2}$ pounds. Find the weight of water in a cistern 5 feet square and 8 feet deep.

10. A grocer bought 50 bushels of potatoes at 60 cents a bushel and retailed them at 25 cents a peck. How much did he gain?

EXERCISE 50

1. How many parcels of tea, each weighing 8 ounces, can be made from 100 pounds?

2. A stationer bought 6 reams of paper at $1.50 a ream and sold it at 10 cents a quire. Find his gain.

3. The floor of a hall is 84 square yards in area. It is 36 feet long. Find its width.

4. A tub of butter weighed 40 pounds 12 ounces. The tub alone weighed 4 pounds 4 ounces. Find the cost of the butter at 20 cents a pound.

5. The angles of a triangle contain 180°. One angle measures 65° and another 85°. Find the third angle.

6. How many minutes are there in 80° 15′?

7. How many minutes are there in 846 seconds?

8. How many seconds are there in 1 hour 1 minute and 1 second?

9. How many square yards of linoleum are required to cover a floor 27 feet long and 21 feet wide?

10. How many stri s of carpet 30 inches wide are needed for a square room 25 feet long?

EXERCISE 51

1. How many pence are there in 4 shillings? in 5s. 6d.? in 7s. 8d.?

2. How many shillings are there in 84d.? in 112d.? in 240d.?

3. Reduce £1 1s. to pence.

4. How much will 10 yards of ribbon cost at 1s. 3d. a yard?

5. How much does a man earn in 12 days who gets 6s. 4d. per day?

6. How many shillings are there in £4 10s.?

7. A lady paid £2 16s. for 8 yards of cloth. What was its price per yard?

8. Find the cost of 6 gross of pens at 3d. per dozen.

9. A piece of cloth is 2s. 6d. a yard. How many yards of this cloth can be bought for £1?

10. If milk cost 4d. a quart and a family uses 2 quarts a day, find the cost of the milk for the month of September.

EXERCISE 52

1. If a loaf weighs 4 lbs., how many ounces does it weigh?

2. How many ounces are there in 2 lbs. Avoirdupois? in 5 lbs.? in 4 lbs. 10 ozs.?

3. How many pounds are there in 2 hundredweight 35 lbs.? in 4 cwt. 50 lbs.?

4. Change 5 lb. 12 oz. to ounces.

5. How many tons are there in 4000 lbs.? in 8000 lbs.? in 14000 lbs.?

6. In one week a Cobalt mine shipped 128000 lbs. of silver ore. How many tons were shipped by this mine that week?

7. When 60 cents is paid for 3 lbs. 12 oz. of beef, what must be paid for 4 lb. 8 oz.?

8. Find the cost of 7 lbs. 8 oz. of butter at 32 cents a pound.

9. The coal in a load weighed 4500 lbs. Find its cost at $8 a ton.

10. At $20 a ton, what will 1600 lbs. of hay cost?

EXERCISE 53

1. How many inches are there in 5 feet? in 6 ft. 6 in.? in 7 ft. 4 in.?

2. Reduce 12 yd. to feet; 7 yd. 2 ft. to feet; 2 yd. to inches.

3. How many yards are there in 18 ft.? in 31 ft.? in 68 ft.?

4. A hand is 4 in. How high is a horse that measures 17 hands at the shoulder?

5. How much will 20 yards of garden hose cost at 8 cents a foot?

6. How much must be paid for a piece of moulding 6 yards 2 ft. long at 15 cents a foot?

7. A girl steps 2 ft. 3 in. when walking. How many yards will she go in 20 steps?

8. A square field is 10 rods along one side. How many yards are there in its perimeter?

9. A boy is wheeling at the rate of 4 ft. per second. At this rate how far will he go in an hour?

10. If a piece of lead pipe 3 ft. 4 in. long costs 60 cents, find the cost of a piece of the same kind 5 feet long.

THE PROPERTY OF THE PROVINCIAL NORMAL SCHOOL REGINA

EXERCISE 54

1. How many square inches are there in 2 sq. ft.? in 3 sq. ft.? in 1 sq. ft. 72 sq. in.?

2. Reduce 72 sq. ft. to square yards; 117 sq. ft. to square yards; 248 sq. ft. to square yards.

3. A field is 40 rods long and 40 rods wide. How many acres are there in it?

4. A farmer had a field containing 15 acres. He sold a lot 20 rods by 16 rods from it. How many acres were left in the field?

5. How much will it cost to plough a field 32 rods by 20 rods at $2 an acre?

6 Find the cost of painting a floor 27 feet by 24 feet at 25 cents a square yard.

7. A surveyor's chain is 4 rods long. How many acres are there in a field 8 chains long and 5 chains wide?

8. How much must be paid for sodding an oblong lawn 90 ft. long and 21 ft. wide at 20 cents a square yard?

9. A field containing 5 acres is divided into lots each 5 rods frontage and 20 rods deep. How many lots are there?

10. An ordinary roadway is 4 rods wide. How many acres are there in a mile of roadway?

EXERCISE 55

1. How many quarts are there in 5 pecks? in 6 pecks 1 gal.? in 3 pecks 1 gal. 1 qt.?

2. Reduce 32 pints to gallons, and 72 gal. to bushels.

3. A horse eats 3 gallons of oats a day. How many bushels will it eat in 30 days?

4. A grocer bought peanuts at $1.60 a bushel and sold them at 5 cents for half a pint. How much did he gain on a bushel?

5. At 30 cents a peck, how many bushels of apples can be bought for $12?

6. If 11 chickens eat 1 gal. 1 quart of grain daily, how long will 10 bushels of grain last?

7. A barrel contains 31½ gallons. How many gallons are there in 8 barrels?

8. A milkman supplies 40 customers with milk daily. Each customer takes on an average 1 quart 1 pint of milk. How many gallons of milk does he sell to these in a week?

9. If a lamp burns a pint of coal oil each day, how many gallons will be burned by it in 60 days?

10. An Indian picked 3 pecks of blueberries and sold them at 10 cents a quart. How much did he get for them?

EXERCISE 56

1. Find the cost of $2\frac{1}{2}$ dozen eggs at 1 cent apiece.

2. Find the cost of 150 pounds of wheat at 90 cents a bushel.

3. How many ounces are there in $4\frac{1}{4}$ pounds of coffee?

4. How much will 3 pounds 12 ounces of butter cost at 20 cents a pound?

5. How many rods are there in $2\frac{1}{2}$ miles? in $3\frac{1}{4}$ miles? in $1\frac{3}{4}$ miles?

6. Find the cost of $2\frac{3}{4}$ yards of ribbon at 16 cents a yard.

7. Silver being worth 50 cents an ounce, find the value of $1\frac{1}{2}$ pounds.

8. If a dozen silver spoons weigh 4 lb. 6 oz., find the weight of a spoon.

9. One hundred cents weigh 1 lb. Avoirdupois and each cent is 1 inch in diameter. Find the value and weight of the cents which, laid side by side, will stretch round the wall of a room 15 feet by 10 feet.

10. How many times can a lamp holding $1\frac{1}{2}$ pints of oil be filled from a can holding 3 gallons?

EXERCISE 57

1. If my watch gains 1 min. 15 sec. a day, how much did it gain during February, 1910?

2. A field 40 rods wide, sold at $60 per acre, brought $1200. How long was the field?

3. If a train runs $\frac{1}{2}$ mile in 30 sec., what is its rate per hour?

4. A boat race began at 5 min. to 12 and ended at 3 min. 40 sec. after 12. How many seconds did it last?

5. A rectangular floor is twice as long as wide. Its perimeter is 60 feet. Find its dimensions.

6. How much will be received for a barrel of apples containing 3 bushels, if they are sold for 20 cents per half peck?

7. A box is a foot long, 9 inches wide and 6 inches deep. Find the total length of all the edges of the box.

8. Water boils at 212° F. If water at 37° F. is put into a kettle to be heated, and the temperature rises steadily 7° each minute, in what time will the water boil?

9. How many 4-inch cubes can be cut from a block of wood 1 ft. 4 in. long, $\frac{3}{4}$ of a foot thick, and a foot wide?

10. How many visiting cards, each $2\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches wide, can be cut from a piece of cardboard 2 ft. long and 1 ft. 3 in. wide?

EXERCISE 58

1. At 3 books for 25 cents, how many would $1.75 purchase?

2. At a penny each, how many pencils would £2 10s. 8d. purchase?

3. How many packages of flour, each weighing 3 lb., could be put up from 3 t. 48 lb.?

4. A rectangular field is 4 chains long and 2 chains wide. Find the cost of fencing it at $1 per yard.

5. Allowing 3 acres to every family, how many families could settle on 6 square miles?

6. At $8 per cord, find the price of wood filling a shed the volume of which is 5120 cubic feet.

7. Feeding a horse 6 quarts of oats a day, how long would 12 bushels last a team?

8. The 1st of January, 1909, was on Friday. At $2 per day, exclusive of Sundays, find a man's wages for the month.

9. If a boy ate an orange at each of his three meals every day, how long would a gross of oranges last him?

10. If 4 pounds of wheat make 3 pounds of flour, how many pounds of flour will 3 bushels of wheat make?

EXERCISE 59

1. From a barrel of oil a merchant sold 16 gal. 1 qt. 1 pt., and it still contained 15 gal. 1 pt. How much did it contain at first?

2. A man travelled 12 mi. 200 rd. by railway, 14 mi. 80 rd. by boat, and 3 mi. 40 rd. on horseback. How far did he travel altogether?

3. Find the total cost of 8 bu. 25 lb. and 3 bu. 35 lb. of wheat at $1.25 per bushel.

4. Find the sum of 2 lb. 11 oz., 4 lb. 15 oz., and 1 lb. 10 oz.

5. How much must be added to 9 lb. 7 oz. avoirdupois to make 12 lb.?

6. How long is it from 30 minutes past 8 in the morning to 30 minutes past 4 in the afternoon?

7. Of a farm of 100 acres, 12 acres 70 sq. rods are wood land. How much is cleared?

8. At $7 per cord, find the price of 4 piles of wood, each containing 2 cords 64 cubic feet.

9. To each of 4 persons a man gave £2 12s. 6d. How much did he give away altogether?

10. If 6 boys divided 13 bu. 2 pk. of nuts among themselves, how much did each receive?

EXERCISE 60

1. The perimeter of a rectangular lot is 1040 ft. If the length is 3 times the width, find its dimensions.

2. Find the cost of fencing a lot a mile square at 5 cents a yard.

3. An acre lot is 40 yds. wide. Find its length.

4. How many yards of carpet are required for a room 16 feet by 12 feet, if carpet is 24 inches wide and laid lengthwise?

5. Find the number of board feet in a fence 240 ft. long and 6 ft. high, if the boards are $1\frac{1}{2}$ inches thick.

6. How many cords of wood are there in a pile 12 ft. long, 8 ft. wide, and 4 ft. high?

7. How many cubic feet of earth have been taken from a cellar 48 ft. long, 12 ft. wide, and 7 ft. deep?

8. A wall 56 ft. long and 2 ft. thick contains 672 cu. ft. of stone. Find its height.

9. If a pile of cordwood is 8 ft. high, how long must it be to contain 4 cords?

10. Find the area of a path 6 ft. wide all around the inside of a garden 24 yd. long by 16 yd. wide.

EXERCISE 61

1. John and Will have each 12 guineas. John pays 12 guineas for a book, while Will pays £12 for his; one thus spends all his money, and the other buys pencils at 2d. each with remainder of his. How many pencils were bought?

2. A box of tea weighs 2 lbs. Avoirdupois, and a box of silver clippings 2 lbs. Troy. Which is the heavier and how much?

3. If school opens at 9 a.m. and closes at 4 p.m. with 1½ hours intermission at noon, how many minutes do you spend in school in a week?

4. What is the total weight in pounds of a bushel of each of the following: wheat, corn, barley, oats, peas?

5. What is the perimeter in feet of a lot 2 mi. square?

6. What is the cost of 9 yds. of cloth at £1 10s. 6d. a yard?

7. A lot containing 2 ac. 80 sq. rd. 10 sq. yd. 6 sq. ft. is divided into 8 equal parts. Find the size of each part.

8. How often can 2 ft. 8 in. be taken from 8 yds.?

9. What is the cost of a pile of wood containing 640 cu. ft. at $5 a cord?

10. How many pairs of shoes worth $4 a pair can I get in exchange for a barrel of pork worth 18 cents a pound?

11. How many acres are there in a farm 100 rods wide and a mile long?

EXERCISE 62

1. Divide $3000 between *A* and *B*, giving *A* $2800 more than *B*.

2. Three times the sum of two numbers is 2700; if one number is 654 more than the other, find the two numbers.

3. Two boys together have 193 marbles; one has 13 more than twice as many as the other. Find the number each has.

4. John has $455, made up of an equal number of $5 bills and $2 bills. How many are there of each?

5. Two boys, who are one mile apart, start at the same time to walk towards each other; when they meet, one has walked 134 yards farther than the other. How far did each walk?

6. Divide $2600 among *A*, *B*, and *C*, so that *B* gets 3 times as much as *A*, and *C* as much as *A* and *B* together.

7. A man bought three houses; one cost $7200, another $2650, and the third $3710. What was the average cost of each?

8. A man mixed 6 lbs. of coffee worth 30c. a pound with 4 lbs. of a better quality and produced a mixture worth 34c. a pound. What was the price of the better quality per pound?

9. The first six girls in the class made an average of 20 marks on Monday. If No. 1 got 22, No. 2, 18, No. 3, 15, No. 4, 20, No. 5, 24, find what No. 6 got.

10. A man travelled 65 miles on Monday, twice that distance on Tuesday, and three times as far on Wednesday. What was his average rate of travelling per day?

FRACTIONS

EXERCISE 63

1. Name five fractions equivalent to $\frac{1}{2}$; to $\frac{1}{3}$; to $\frac{1}{4}$.

2. Name three fractions each equal to $\frac{2}{3}$; to $\frac{3}{4}$; to $\frac{4}{5}$.

3. Name a fraction with lower terms equivalent to $\frac{8}{12}$; to $\frac{12}{15}$; to $\frac{14}{30}$.

4. Reduce $4\frac{2}{3}$ to thirds, and $5\frac{3}{8}$ to eighths.

5. How many twelfths are there in $4\frac{5}{12}$?

6. Reduce the following to equivalent fractions having the least common denominator: $\frac{3}{4}$ and $\frac{5}{12}$; $\frac{2}{3}$ and $\frac{4}{15}$; $\frac{3}{5}$ and $\frac{7}{20}$.

7. Reduce the following to equivalent fractions having the least common denominator: $\frac{1}{2}$ and $\frac{1}{3}$; $\frac{1}{4}$ and $\frac{1}{5}$; $\frac{2}{3}$ and $\frac{2}{5}$.

8. Reduce the following to whole or mixed numbers:

$$\frac{7}{2},\ \frac{13}{4},\ \frac{18}{5},\ \frac{25}{6},\ \frac{47}{8}.$$

9. Find the value of the following: $\frac{2}{3}$ of 45; $\frac{3}{5}$ of 80; $\frac{4}{7}$ of 35.

10. A watch cost $32 and a chain $\frac{3}{8}$ as much. How much did both cost?

EXERCISE 64

1. Supply numerators for the following:

$$\frac{6}{18} = \frac{\ }{3},\ \frac{24}{32} = \frac{\ }{4},\ \frac{2}{5} = \frac{\ }{15},\ \frac{3}{7} = \frac{\ }{21}.$$

2. How many fourths are there in $17\frac{3}{4}$?

3. How many feet are there in $7\frac{3}{12}$ feet?

4. Reduce the following to equivalent mixed numbers:
$\frac{37}{8}$, $\frac{23}{7}$, $\frac{58}{5}$, and $\frac{74}{11}$.

5. Reduce the following to improper fractions:
$5\frac{3}{8}$, $7\frac{3}{11}$, $8\frac{5}{12}$, $9\frac{3}{7}$.

6. Change 7 to a fraction with 9 for denominator.

7. A barrel of coal oil contained 42 gallons; $\frac{3}{7}$ of it was sold at 20 cents a gallon. How much was received for what was sold?

8. A grocer sold $\frac{1}{6}$ of a cheese to one man and $\frac{1}{7}$ of it to another. If the cheese weighed 42 pounds at first, how many pounds of it remained unsold?

9. I paid $6 for a cord of wood and $\frac{1}{3}$ as much for a ton of coal. At this rate find the cost of $5\frac{1}{2}$ tons of coal.

10. A farmer had 400 bushels of wheat. He sold $\frac{2}{5}$ of it at one time and $\frac{3}{4}$ of the remainder at another time. How much is the remainder worth at 90 cents a bushel?

EXERCISE 65

1. Change the following to twelfths: $\frac{1}{2}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{5}{6}$.

2. By what number must the terms of the fraction $\frac{3}{5}$ be multiplied to reduce the fraction to tenths? to twenty-fifths? to fifteenths?

3. Reduce $\frac{2}{3}$, $\frac{3}{5}$, and $\frac{1}{4}$ to equivalent fractions with their least common denominator.

4. If $\frac{2}{3}$ of a melon be cut into twelfths and sold at 5 cents for each piece, how much will be received for it?

5. How many dollars will be needed to give each of 32 boys $\$\frac{1}{4}$?

6. If $2\frac{1}{3}$ yards of ribbon are cut into pieces each $\frac{1}{18}$ yard long, how many pieces will there be?

7. Change the following to sixths: $2\frac{5}{6}$, $5\frac{1}{6}$, $4\frac{2}{3}$, $7\frac{1}{2}$.

8. Find the sum of $\frac{1}{3}$ of \$60 and $\frac{2}{7}$ of \$35.

9. Find the difference between $\frac{3}{4}$ of \$36 and $\frac{1}{8}$ of \$35.

10. After sailing 2400 miles, a ship has concluded $\frac{1}{10}$ of its voyage. What is the length of the voyage?

EXERCISE 66

1. Change $\frac{1}{8}$, $2\frac{1}{2}$, $5\frac{3}{4}$, and $2\frac{1}{8}$ each to fourths.

2. Find the sum of $\frac{1}{2}$ and $\frac{3}{4}$; of $\frac{2}{3}$ and $\frac{5}{7}$.

3. Jane bought $\frac{5}{8}$ yard of ribbon at one time and $\frac{3}{4}$ yard at another time. How much did she buy altogether?

4. John rode $15\frac{1}{2}$ miles on his wheel on Monday and $16\frac{3}{4}$ miles on Tuesday. How far did he ride in the two days?

5. From 25 pounds of cheese $16\frac{3}{4}$ pounds are sold. How much remains unsold?

6. Mary bought $\frac{3}{4}$ yard of ribbon, Jane bought $\frac{7}{8}$ yard of the same ribbon. Who bought the more and how much?

7. How far is it round a lot $4\frac{1}{2}$ rods deep and $2\frac{1}{4}$ rods frontage?

8. How much does the sum of $\frac{1}{2}$ and $\frac{1}{3}$ exceed the sum of $\frac{1}{3}$ and $\frac{1}{4}$?

9. Of what number is $2\frac{1}{2}$ one-fifth?

10. A man ploughed a field of $7\frac{1}{2}$ acres at the rate of $\frac{1}{8}$ acre every hour. How long was he in ploughing the field?

EXERCISE 67

1. From $\frac{4}{12}$ take $\frac{2}{3}$ and from $\frac{13}{16}$ take $\frac{1}{8}$.

2. Subtract $\frac{3}{4}$ from $\frac{4}{12}$ and $\frac{5}{6}$ from $\frac{7}{14}$.

3. Find the difference between $\frac{1}{4}$ and $\frac{3}{8}$; between $\frac{1}{2}$ and $\frac{4}{7}$; between $\frac{3}{5}$ and $\frac{13}{18}$.

4. A man owned $\frac{7}{8}$ of a store and sold $\frac{1}{4}$ of the store. How much did he still own?

5. A post is $\frac{1}{3}$ of its length in the air, $\frac{1}{4}$ in the water, and the rest in the mud. What part of the post is in the mud?

6. In an orchard $\frac{1}{3}$ of the trees are cherry trees, $\frac{1}{4}$ are peach trees, and the rest are apple trees. What part of the trees are apple trees?

7. A man bought a watch for $\frac{5}{8}$ of \$60 and sold it for $\frac{3}{4}$ of \$60. How much did he gain?

8. The difference between $\frac{1}{2}$ of John's marbles and $\frac{1}{5}$ of them is 15 marbles. How many has he?

9. From 20 gallons of maple syrup $5\frac{3}{4}$ gallons were sold to one customer and $7\frac{1}{2}$ gallons to another. How many gallons remained unsold?

10. A man bought a coat for \$8[illegible] nd a vest for \$3$\frac{5}{8}$, and gave in payment two ten-do[illegible] bills. How much change should he receive?

EXERCISE 68

1. Find the following: $\frac{1}{2}$ of $\frac{2}{5}$; $\frac{1}{3}$ of $\frac{6}{7}$; $\frac{1}{5}$ of $\frac{10}{13}$.

2. How much is $\frac{2}{3}$ of $\frac{6}{7}$? $\frac{3}{4}$ of $\frac{2}{5}$? $\frac{2}{5}$ of $\frac{10}{11}$?

3. Find the value of the following:

$\frac{2}{3}$ of $1\frac{1}{2}$; $\frac{2}{3}$ of $1\frac{1}{3}$; $\frac{2}{3}$ of $3\frac{3}{4}$.

4. Find $\frac{1}{2}$ of $\frac{1}{3}$ and $\frac{1}{4}$ of $\frac{1}{5}$.

5. How much is $\frac{2}{3}$ of $\frac{1}{2}$? $\frac{2}{3}$ of $\frac{3}{7}$?

6. Find the value of $\frac{2}{3}$ of $\frac{5}{7}$; $\frac{3}{4}$ of $\frac{7}{8}$; $\frac{3}{5}$ of $\frac{4}{11}$.

7. A man bought 4 tons of coal and burned $\frac{3}{4}$ of it. How much did he burn?

8. What part of an acre is $\frac{3}{4}$ of $\frac{2}{3}$ of an acre?

9. Find the cost of $\frac{5}{8}$ of a yard of cloth at $\frac{7}{8}$ of a dollar a yard.

10. A man owned $\frac{2}{3}$ of a mill and sold $\frac{3}{5}$ of his share for $4000. At that rate, what was the mill worth?

EXERCISE 69

1. How much is 3 times each of the following:

$\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{6}$, $1\frac{5}{12}$, $1\frac{7}{10}$, $1\frac{4}{5}$?

2. Find the value of the following: $\frac{1}{3}$ of 12; $\frac{3}{8}$ of 8; $\frac{5}{12}$ of 18; $\frac{2}{5}$ of 10.

3. Multiply each of the following by 5:

$2\frac{2}{3}$, $4\frac{1}{2}$, $5\frac{2}{5}$, $7\frac{3}{4}$, $8\frac{3}{7}$.

4. How much is 6 times $5\frac{3}{4}$? 4 times $7\frac{3}{7}$? 7 times $3\frac{3}{14}$? 5 times $8\frac{7}{10}$?

5. Find the cost of $8\frac{1}{2}$ yards of ribbon at 10 cents a yard.

6. When butter is worth $22\frac{3}{4}$ cents a pound, how much are 12 pounds worth?

7. How far can a man walk in 8 hours at an average rate of $3\frac{3}{4}$ miles an hour?

8. Find the cost of $9\frac{3}{8}$ tons of hay at $9 a ton.

9. One winter I burned 10 tons of coal in my furnace. What did it cost me at $6\frac{3}{4}$ a ton?

10. The wages of a carpenter being $2\frac{3}{8}$ a day, how much will he earn in six days?

EXERCISE 70

1. Find the product of $\frac{3}{4}$ and $\frac{2}{3}$; of $4\frac{1}{2}$ and $3\frac{1}{3}$.

2. Multiply $1\frac{1}{3}$ and $3\frac{1}{3}$ together.

3. Find the value of $5\frac{1}{2} \times 6\frac{2}{3}$ and $5\frac{1}{3} \times 2\frac{1}{4}$.

4. From $2\frac{1}{2}$ times $3\frac{2}{3}$ take $5\frac{1}{2}$.

5. How far will a man walk in $2\frac{1}{2}$ hours at the rate of $3\frac{1}{2}$ miles per hour?

6. Find the cost of $6\frac{1}{4}$ pounds of cheese at $17\frac{1}{2}$ cents a pound.

7. If a horse eats $\frac{3}{4}$ of a ton of hay per month, how much will the hay for $3\frac{1}{3}$ months cost at $12 a ton?

8. Find the cost of $9\frac{1}{3}$ yards of cloth at $2\frac{1}{4}$ a yard.

9. A boy earns $1\frac{1}{2}$ per day and his father $2\frac{1}{2}$ times as much. How much will they earn together in 6 days?

10. If a man can hoe $\frac{3}{8}$ of an acre of turnips in a day, how much can he hoe in $7\frac{1}{2}$ days?

EXERCISE 71

1. How often is $\frac{1}{2}$ contained in 2? in $2\frac{1}{2}$? in $3\frac{1}{2}$?

2. How many times is $\frac{1}{3}$ contained in 2? in 5? in $6\frac{1}{3}$?

3. Divide 5 by $\frac{2}{3}$; by $\frac{3}{4}$; by $\frac{5}{8}$; by $\frac{2}{5}$.

4. If 2 ducks cost $\frac{6}{10}$ of a dollar, how much will 1 duck cost?

5. Divide $\frac{12}{17}$ by 2; by 3; by 4; by 6.

6. Divide $\frac{1}{2}$ by 2; by 3; by 5; by 6.

7. If a man ride on his bicycle $17\frac{1}{8}$ miles in 2 hours, how far does he go in 1 hour?

8. If a man pay $\$60\frac{3}{4}$ for 7 tons of coal, what is the price of coal per ton?

9. If a man cuts $15\frac{3}{4}$ cords of wood in 7 days, how much wood can he cut in 1 day?

10. A lady bought 10 yards of cloth for $\$7\frac{1}{2}$. How much is that a yard?

EXERCISE 72

1. Find the value of $\frac{3}{8} \div 6$, and of $\frac{7}{16} \div 8$.

2. Divide $4\frac{3}{8}$ by 7, and $2\frac{1}{5}$ by 7.

3. At $\$\frac{1}{4}$ per pound, how many pounds of figs can be bought for \$4?

4. A man who chops $1\frac{1}{2}$ cords of wood a day will require how long to chop $2\frac{3}{4}$ cords?

5. If a fish weighs $1\frac{1}{2}$ pounds, how many such fish will weigh $13\frac{1}{2}$ pounds?

6. The product of two numbers is 36, and one of them is $2\frac{1}{4}$; find the other.

7. At $\frac{7}{16}$ of a dollar per yard, how many yards can be bought for $\$4\frac{1}{2}$?

8. A man saws $1\frac{1}{2}$ cords of wood a day. In how many days will he saw $14\frac{3}{4}$ cords?

9. How many pounds of coffee at $\$\frac{3}{8}$ a pound can be bought for $\$4\frac{1}{2}$?

10. If 3 yards of cloth cost \$2, how many yards can be bought for $\$11\frac{1}{3}$?

EXERCISE 73

1. Find the value of $4\frac{2}{3} \times 6$, and of $5\frac{1}{4} \div 6$.

2. Name four fractions each equal to $\frac{5}{6}$.

3. Express $\frac{45}{60}$ in its lowest terms.

4. The product is 15, the divisor is $3\frac{3}{4}$; find the quotient.

5. If 6 pounds of sugar cost $\$\frac{3}{5}$, find the cost of $8\frac{1}{2}$ pounds.

6. How much will 4 oranges cost, if 10 oranges can be bought for 25 cents?

7. When a certain number is multiplied by $3\frac{2}{3}$ the product is $6\frac{3}{4}$. What is the number?

8. How far can a boy wheel in 3 hours, if he goes $20\frac{1}{3}$ miles in $2\frac{2}{3}$ hours?

9. What is the length of the circumference of a wheel which turns $3\frac{3}{4}$ times in 45 feet?

10. A yard of ribbon cost $\$\frac{1}{4}$. How many yards of the same ribbon can be bought for $\$2\frac{2}{3}$?

EXERCISE 74

1. Divide the sum of $\frac{2}{3}$ of 21 and $\frac{3}{7}$ of 16 by 7.

2. How many fifths are there in 7? in $9\frac{2}{5}$? in $12\frac{3}{5}$?

3. Two-fifths of 25 is $\frac{1}{3}$ of what number?

4. Find the value of $5\frac{7}{8} + 7\frac{3}{4} + 4\frac{1}{2}$.

5. The difference between $\frac{2}{3}$ of my money and $\frac{2}{5}$ of it is $8. How much money have I?

6. After a man spent $\frac{3}{7}$ of his money, he had $36 left. How much had he at first?

7. If $\frac{1}{2}$ of $\frac{2}{3}$ of a number is 36, what is the number?

8. For $4\frac{1}{2}$ pounds of meat I pay 21 cents more than for $3\frac{1}{3}$ pounds. How much is meat a pound?

9. A conductor gets 44 cents for a trip of $1\frac{1}{8}$ hours. At what rate is he paid per hour?

10. How far can a man walk in $4\frac{1}{2}$ hours whose rate of walking is 10 miles in $3\frac{1}{3}$ hours?

EXERCISE 75

1. Reduce to an improper fraction $5\frac{5}{13}$.

2. Add $\frac{1}{7}$ and $\frac{1}{8}$.

3. From $2\frac{1}{4}$ take $\frac{3}{4}$.

4. Reduce to its lowest terms $\frac{38}{57}$.

5. Simplify $\frac{5}{9}$ of $\frac{7}{40}$.

6. Divide $1\frac{6}{8}$ by $\frac{4}{5}$.

7. Simplify $\dfrac{3\frac{1}{2}}{1\frac{3}{5}}$.

8. If 10 lbs. of tea cost $2.80, what will $2\frac{1}{2}$ lbs. cost?

9. What is the length of the radius of a circle whose circumference measures 88 ft.?

10. Simplify $\frac{7}{16}$ of $\frac{32}{63} + \frac{5}{9}$.

EXERCISE 76

1. Reduce to its lowest terms $\frac{58}{145}$.

2. Add $\frac{2}{3}$, $\frac{3}{5}$, and $\frac{5}{6}$.

3. Simplify $1\frac{7}{15} \times \frac{30}{28} \div \frac{1}{8}$.

4. Simplify $\frac{7\frac{1}{2}}{1\frac{4}{5}} + \frac{12\frac{1}{2}}{2\frac{1}{2}}$.

5. From $3\frac{5}{13}$ take $\frac{7}{13}$.

6. Reduce £$\frac{3}{5}$ to shillings and pence.

7. Reduce $16\frac{1}{2}$ yards to rods.

8. If 9 yd. of muslin cost $2.25, what will $2\frac{2}{3}$ yd. cost?

9. Find the area of a rectangle whose length is $7\frac{1}{2}$ yd. and width 10 ft.

10. Simplify $5\frac{1}{2} \div 8\frac{1}{4} \times 4\frac{1}{2}$.

EXERCISE 77

1. If $\frac{2}{5}$ of a number is 10, what is $\frac{1}{5}$ of the number?

2. If 12 is $\frac{3}{7}$ of a number, find $\frac{3}{4}$ of the number.

3. What number added to 3 times $\frac{2}{3}$ of 25 will make the sum 74?

4. What number is that to which, if its half be added, the sum is 60?

5. How many times is $1\frac{3}{7}$ contained in $11\frac{3}{7}$?

6. At $\$1\frac{7}{8}$ per yard, how many yards can be bought for $32?

7. If a ton of coal is worth $\$6\frac{2}{3}$, find the value of 7 tons.

8. If a farmer sows $1\frac{3}{4}$ bushels of wheat to the acre, how much will be required to seed a field of 20 acres?

9. The sum of two numbers is $20\frac{1}{4}$; one of the numbers is $12\frac{1}{2}$. Find the other number.

10. How much is $\frac{2}{3}$ of $12 \times \frac{3}{4}$ of 16?

EXERCISE 78

1. Eighteen is $\frac{3}{4}$ of what number?

2. Of what number is 12 the $\frac{5}{8}$?

3. Find a number of which 100 is $\frac{4}{3}$.

4. Reduce $\frac{2}{3}$, $\frac{3}{5}$, and $\frac{1}{4}$ to equivalent fractions with a common denominator.

5. How many bushels of clover seed can a farmer buy for $\$7\frac{1}{2}$ at $\$2\frac{1}{4}$ a bushel?

6. If $4\frac{1}{2}$ bushels of apples cost $\$7\frac{1}{5}$, find the cost of 5 bushels.

7. If a man rides 50 miles on his bicycle in $6\frac{2}{3}$ hours, how long will it take him to ride 30 miles?

8. When $\frac{1}{3}$ of a man's age is added to $\frac{1}{4}$ of his age the sum is 28 years. How old is he?

9. How many suits of clothes of $4\frac{1}{3}$ yards each can be cut from a piece of cloth containing 52 yards?

10. When 2 tons of coal cost as much as 3 cords of wood, what is the price of coal if wood is $\$4\frac{1}{2}$ a cord?

EXERCISE 79

1. How many times is $3\frac{1}{8}$ contained in $6\frac{4}{10}$?

2. Simplify $4\frac{1}{4} \div 1\frac{1}{3}$, and $4\frac{2}{5} \times 3\frac{3}{4}$.

3. Find the difference between $\frac{2}{3}$ of $\frac{7}{8}$ and $\frac{2}{7} \times \frac{3}{5}$.

4. A number increased by $\frac{1}{5}$ of itself is $\frac{1}{2}\frac{8}{5}$. Find the number.

5. If $2\frac{1}{4}$ quarts of cream make a pound of butter, how many pounds of butter will 18 quarts make?

6. A farmer sows $1\frac{1}{4}$ bushels of wheat on an acre. How much will he sow on $7\frac{1}{2}$ acres?

7. If a boy can run $16\frac{1}{2}$ yards in 3 seconds, how far will he run in $4\frac{1}{2}$ seconds at this rate?

8. The product of two numbers is 24 and one of them is $5\frac{1}{3}$. Find the other.

9. If $3\frac{1}{3}$ yards of ribbon are worth $26\frac{2}{3}$ cents, how many yards will $1 buy?

10. A box of soap weighed $36\frac{1}{2}$ pounds. The box alone weighed $2\frac{3}{8}$ pounds. How much did the soap weigh?

EXERCISE 80

1. Find the cost of $2\frac{3}{4}$ yd. of cloth at 15 cents for a quarter yard.

2. If $\frac{1}{5}$ of an acre costs $30, find the value of $3\frac{2}{5}$ acres.

3. How much will 8 lb. of sugar cost, if $2\frac{1}{2}$ lb. cost 15 cents?

4. If 3 cricket balls can be bought for $4\frac{1}{2}$, how much will 10 such balls cost?

5. How much sugar can be bought for $7\frac{1}{3}$, when $4\frac{1}{2}$ lb. can be bought for $1\frac{1}{4}$?

6. If $\frac{3}{5}$ of a ton of hay costs $6\frac{3}{4}$, find the cost of 4 tons.

7. The difference between $\frac{5}{6}$ of my money and $\frac{2}{3}$ of it is $6. How much money have I?

8. Twelve times $2\frac{1}{2}$ is how many times $\frac{1}{2}$ of 26?

9. What is the result of $4\frac{2}{3} - 4\frac{1}{4} + 6\frac{1}{2}$?

10. One-half of a number increased by three-eighths of the number is 14. Find the number.

EXERCISE 81

1. Name 5 fractions each equal to $\frac{3}{5}$.

2. Name 5 fractions each with smaller terms equal to $\frac{24}{36}$.

3. How many times is $\frac{3}{7}$ contained in 6?

4. At $\frac{3}{8}$ of a dollar a pound, how many pounds of coffee can be bought for $3\frac{3}{4}$?

5. A can dig a garden in $10\frac{2}{3}$ days; B can dig it in $1\frac{1}{3}$ days less. How long does it take B?

6. From a pile of wood containing 24 cords $18\frac{1}{2}$ cords are sold. What is the remainder worth at $4 a cord?

7. An agent had a journey of 30 miles to make. He drove at the average rate of $8\frac{1}{3}$ miles an hour. How long was he on the way?

8. Find the average of 17, 21, 0, and 23.

9. The average of 6 numbers is $7\frac{2}{3}$. The average of 5 of the numbers is $7\frac{3}{5}$. What is the sixth number?

10. How far will a train running at the rate of 50 miles an hour go in 48 minutes?

EXERCISE 82

1. If a man can do a piece of work in 4 days, what part of it can he do in 1 day? in 2 days? in 3 days?

2. A can do a piece of work in 3 days; B can do the same work in 4 days. How much can both working together do in 1 day?

3. A and B together can do a piece of work in 4 days. If A can do it in 6 days, how much does B do in 1 day?

4. *A* can do $\frac{2}{5}$ of a piece of work in 1 day. How long will it take him to do all the work?

5. After *A* has worked 3 days at a piece of work it is $\frac{1}{3}$ done. How many more days will he require to complete the work?

6. *B* can do $\frac{4}{15}$ of work in 1 day. In how many days can he do the entire work?

7. *A* can do a piece of work in 4 days; *B* can do it in 5 days. If both begin to work together, how long will it take to do the entire work?

8. *A* and *B* together can do a piece of work in 6 days; *A* can do it in 10 days. How long will it take *B* by himself to do the work?

9. *A* can do a piece of work in 4 days; *B* can do it in 3 days, and *C* in 6 days. If all work together, in what time will the work be done?

10. *A* and *B* together can do a piece of work in 8 days; *A* by himself can do it in 12 days. How much of the work can *B* do in 6 days?

EXERCISE 83

1. If *A* can do a piece of work in $4\frac{1}{2}$ days, what part of it can he do in 1 day?

2. If *B* can do $\frac{7}{10}$ of a piece of work in 1 day, how many days will he require to do the whole work?

3. If *A*'s working ability is $\frac{1}{2}$ of *B*'s, and *B* takes 5 days to do a piece of work, how long will it take *A* to do the same work?

4. *B*'s working ability is $\frac{1}{3}$ of *A*'s. How long will both working together take in doing a work which *B* by himself can do in 9 days?

5. A earns \$4 per day, and B earns \$3 per day. At the end of a certain time they have together earned \$49. How much has each earned?

6. For every \$4 A has, B has \$5. Together they have \$180. How much has each?

7. Divide \$24 into two parts so that the first sum may be $\frac{1}{3}$ of the other.

8. Half of A's money is equal to $\frac{3}{4}$ of B's. If A has \$36, how much has B?

9. If a man spends $\frac{1}{8}$ of his salary and has \$350 remaining, how much was his salary?

10. Divide \$30 between A and B so that B's share may be equal to $\frac{2}{3}$ of A's.

EXERCISE 84

1. The prime factors of a number are 2, 3, 5, and 7. What is the number?

2. Resolve the number 170 into prime factors.

3. How many loads of earth of 1 cu. yd. each will be taken out of the cellar of a building 36 feet long, 24 feet wide, and 9 feet deep?

4. If 15 cents is $\frac{1}{8}$ of the cost of a book, find the cost of 4 such books.

5. The greater of two numbers is 64 and their difference is 24. Find their product.

6. What number added to $\frac{2}{5}$ of 60 will make 40?

7. Reduce each of the following to its lowest terms:

$\frac{24}{32}$, $\frac{36}{40}$, $\frac{45}{63}$, $\frac{48}{60}$.

8. Find the sum of $\frac{1}{4}$ of \$80, and $\frac{1}{8}$ of \$72.

9. Find the cost of 3500 feet of lumber at \$40 per M.

10. If the eleven men of a football team weigh together 1 ton 2 lb., find the average weight of the men.

EXERCISE 85

1. Four-fifths of 75 is $\frac{3}{5}$ of what number?

2. What number added to 3 times $\frac{1}{3}$ of 36 will make 100?

3. What number is that to which if $\frac{3}{5}$ of itself be added, the sum will be 72?

4. Divide the continued product of 8, 10, and 12 by the continued product of 2, 3, 5.

5. Find the least number that will contain both 12 and 16 an exact number of times.

6. The aggregate attendance at a public school during a week was 940. Find the daily average attendance.

7. Change $\frac{9}{15}$, $\frac{20}{25}$, and $\frac{24}{40}$ each to fiftieths.

8. A web of cloth containing 48 yards was sold at $37\frac{1}{2}$ cents a yard. For how much did it sell?

9. If a reaping machine can cut $10\frac{1}{2}$ acres of grain in a day, how much can be cut by it in $2\frac{2}{3}$ days?

10. A man who owned $\frac{9}{10}$ of a building sold $\frac{1}{3}$ of his share. What part of the building did he sell?

11. How much is cloth worth a yard, when 30 yards are exchanged for 15 dozen of eggs at [illegible] cents a dozen?

DECIMALS

EXERCISE 86

1. Express the following decimals as common fractions:

.3, .7, .03, .07, .009.

2. Express the following decimals as common fractions in their lowest terms: .4, .8, .04, .08, .05.

3. Express the following fractions as decimals:

$\frac{1}{2}$, $\frac{3}{5}$, $\frac{3}{4}$, $\frac{9}{10}$, $\frac{3}{8}$.

4. Express as hundredths: .3, .4, .7, 8.

5. Express the following whole numbers as tenths:

6, 8, 12, 7, 11.

6. Express as tenths the following:

4.5, 5.6, 7.2, 8.7, 9.5.

7. Find the sum of the following: 9, 7.5, 3.4.

8. Simplify each of the following:

3.4 + 7.9, 8.6 + 9.8, 7.5 + 9.

9. From 10 take 3.4 and from 9.1 take 5.7.

10. Find the number that added to the sum of 7 and 9.5 will make 20.

EXERCISE 87

1. Express 7 as tenths, as hundredths, as thousandths.

2. How many hundredths are there in 3.6? in 4.8? in 5.25?

3. From the sum of 9.4 and 7.6 take 3.45.

4. Multiply 4.5 by 4; by 6; by 8; by 10.

5. Multiply 1.2 by .8; by .7; by 1.1; by 1.2.

6. If a yard of cloth costs $2.5, what will .8 yd. cost?

7. Find the value of .5 a. of land at $37 per acre.

8. How far will a man travel in an automobile in .8 hr. at the rate of 12 mi. per hour?

9. Find the product of the sum of 3.6 and 4.9, and the difference between 4.8 and 5.4.

10. A milkman sold 2.25 quarts of milk to each of 12 customers. How much milk did he sell?

EXERCISE 88

1. Divide each of the following numbers by 5:

625, 62.5, 6.25.

2. Divide each of the following numbers by 10:

840, 760, 360, 55, 485.

3. Divide each of the following by 10:

36.5, 78.6, 43.6, 5.48.

4. If 2.5 yards of cloth cost $20, find the cost of 1 yard.

5. A man has a journey of 10 mi. to go. He has already walked 1.5 hr. at the rate of 4 mi. per hour. How far has he yet to go?

6. Divide 64 by .8 and multiply the result by 9.

7. A farmer has .75 of his seeding done and has still 50 a. to seed. How many acres does he intend to have in crop?

8. Divide the product of .8 and .6 by .4.

9. A man is driving at the rate of 12 mi. per hour. How many rods is that per minute?

10. If 4.8 yards of cloth are required to make a coat, how many coats can be made from 96 yards?

11. Find the value of 800 cubic feet of gas at 90 cents per thousand cubic feet.

EXERCISE 89

1. Express each of the following numbers as tenths:

4, 7.2, $\frac{1}{5}$, $3\frac{1}{2}$.

2. Divide each of the following numbers by .4:

6, 10, 8.8, 90, and 100.

3. Multiply each of the following numbers by .6:

.8, 72.5, 3.55, 45.5, and 5.25.

4. How many hours are there in .25 of a day?

5. A person paid $\frac{3}{8}$ of a debt of $1000. How much did he pay?

6. It is 27.5 feet across a lot. How many inches is it?

7. Divide $42 into an equal number of dollars, half-dollars, and quarter-dollars.

8. Divide 44 gal. into an equal number of gallons, quarts, and pints.

9. If a turkey costs $3.5, how many can be bought for $21?

10. I bought $\frac{2}{3}$ of $4\frac{1}{2}$ cords of wood for $\frac{1}{5}$ of $60. What did it cost a cord?

11. The circumference of a wheel is 3.1416 times the diameter. Find the circumference of a wheel 5 feet in diameter.

MISCELLANEOUS EXERCISES

EXERCISE 90

1. What part of \$1 is 25c.? is 50c.? is 75c.?

2. What part of \$1 is 20c.? is 40c.? is 60c.?

3. What part of \$1 is 25c.? is $12\frac{1}{2}$c.? is $37\frac{1}{2}$c.?

4. How much will a boy earn in 56 days at 75c. a day?

5. When apples are sold at $37\frac{1}{2}$c. a peck, find the cost of 4 bushels.

6. In one week a street-car conductor worked 60 hr. How much did he earn at \$$\frac{1}{2}$ per hour?

7. What part of 100 is 25? is $12\frac{1}{2}$? is $37\frac{1}{2}$?

8. Multiply the following:

   (*a*) 64, 48, 32, 24, and 26 each by $12\frac{1}{2}$.

   (*b*) 24, 32, 48, 64, and 72 each by $37\frac{1}{2}$.

9. What part of 1000 is 500? is 250? is 125?

10. Multiply each of the following numbers by 125:

    24, 32, 48, 72, 84, 42.

EXERCISE 91

1. Find the result of

   (*a*) $36 \times 12\frac{1}{2}$.
   (*b*) 44×25.
   (*c*) $56 \times 37\frac{1}{2}$.
   (*d*) $48 \times 37\frac{1}{2}$.
   (*e*) 68×25.
   (*f*) $76 \times 12\frac{1}{2}$.

2. How much will 44 sheep cost at \$$5\frac{1}{4}$ a head?

3. The wages of a man are \$$3.37\frac{1}{2}$ a day. How much will he earn in 24 days?

4. A web of cloth containing 48 yards was sold at 37½ cents a yard. For how much did it sell?

5. What is the cost of 96 dozen eggs at 37½ cents a dozen?

6. If a farmer raises 125 bushels of potatoes on an acre, how much does he raise on 32 acres?

7. A mining company shipped 24 tons of ore per day. Find the daily value of the output if the ore sold at $125 a ton.

8. Find the cost of 16 yards of cloth at 37½ cents a yard.

9. An acre of land was sold at ⅛ more than cost for $420. How much did it cost?

10. A circular flower bed is 21 feet in diameter. How long is its circumference?

EXERCISE 92

1. How much heavier is a bag containing 2½ bushels of wheat than one containing 3 bushels of barley?

2. It takes *A* 4 hours 25 min. to walk a certain distance. *B* walks this distance in 3 hrs. 45 min. How much sooner than *B* must *A* start so that they may finish together?

3. If 18 lbs. of beef are divided equally among 20 men, how much will 5 of them receive?

4. In one field there are 127 sheep, in a second 84 and in a third 28. How many sheep are there in the three fields and how many more are there in the first field than in the other two together?

5. A class of 40 little girls has a plot of ground 30 feet long and 16 feet wide for a school garden. Find the size of each girl's plot.

6. A roll of carpet contains just enough yards to cut into exact lengths of either 8, 12, 16, or 24 yards. Find the length of the roll.

7. Tom's father will be 53 years old in 9 years. Tom is 12 years old. How old was his father when Tom was born?

8. If half a bushel of cranberries are bought for $1.25 and sold at 10c. a quart, how much is gained?

9. Eight bottles of equal size contain 3 gallons. How much does each bottle contain?

10. A square cellar that is 6 feet deep contains 2400 cubic feet. What are its other dimensions?

EXERCISE 93

1. If 12 yards of cloth cost $1.60, how much will 39 yards cost?

2. Divide 52 into two parts, of which the larger is $2\frac{1}{4}$ times the less.

3. A and B can build a wall in 8 days, but with the aid of C they can build it in 5 days. How long will it take C to build it alone?

4. If a barrel of meat will last 15 men 20 days, how long will it last 12 men?

5. The difference between two numbers is 78, and the greater number is 200. Find the less.

6. The smaller of two numbers is 30.7, and their difference is 8.93. Find the larger number.

7. Find $\frac{1}{8}$ of the number of which $\frac{3}{5}$ is $6\frac{3}{5}$.

8. How many yards of carpet $\frac{3}{4}$ of a yard wide are equal to 36 yds. that are a yard wide?

9. The dividend is 283, the divisor 12, and the remainder 7. Find the quotient.

10. What per cent. is 24 of 72? of 120? of 360? of 150?

EXERCISE 94

1. The prime factors of a number are 2, 3, 5, 7 and 11. Find the number.

2. A boy can saw $\frac{5}{8}$ of a cord of wood in a day. In how many days can he saw 4 cords?

3. The divisor is 15, the remainder 8, and the quotient 25. Find the dividend.

4. A man sold a lot for $600 and gained $\frac{3}{5}$ of what the lot cost. Find the cost of the lot.

5. What number added to 4 times $\frac{3}{7}$ of 28 will make the sum 100?

6. In walking a 5-mile race a man stepped 40 inches. How many steps did he take?

7. How much does a man earn in 9 days who gets 5s. 8d. per day?

8. A hardware merchant bought $3\frac{1}{4}$ dozen handsaws at $18 per dozen. He sold them all at a gain of 50 cents apiece. How much money did he get for them?

9. The circumference of a wheel is nearly $3\frac{1}{7}$ times its diameter. How far will a bicycle having 28-inch wheels go while they make 20 revolutions?

10. How much must be paid for 3.5 pecks of clover seed at $4.80 per bushel?

11. How much does a man save in 27 weeks, who gets $20 a week and saves $\frac{2}{5}$ of it?

EXERCISE 95

1. Find the cost of 360 acres of land at $37\frac{1}{2}$ per acre.

2. How much must be paid for 5 boards, each 16 inches wide and 16 feet long, at 5 cents a square foot?

3. How many strokes does a clock make between the hours of 4 and 10, both hours included?

4. At what rate per hour is a train running that makes a journey of 90 miles in 2 hours 15 minutes?

5. The minuend is 412 and the remainder 138. Find the subtrahend.

6. Three of the prime factors of 546 are 2, 3, and 7. Find the fourth factor.

7. Divide the continued product of 12, 15, and 18 by the continued product of 4, 5, and 6.

8. Running at the rate of 50 miles per hour, how far will a train go in 48 minutes?

9. *A* can do a piece of work in 9 days which *B* can do in 12 days. How long will it take both working together to do it?

10. How long will it require a boy who earns $1.37\frac{1}{2}$ a day to earn $44?

11. A boy working for $1.62\frac{1}{2}$ a day earned $26 in a certain time. How many days did he work?

12. How many tons of coal at $6.75 a ton can be bought for $540?

PART II

PERCENTAGE

EXERCISE 96

1. What part of anything is $\frac{10}{100}$ of it? is $\frac{25}{100}$ of it? is $\frac{12\frac{1}{2}}{100}$ of it? is $\frac{33\frac{1}{3}}{100}$ of it?

2. What part of anything is 10% of it? is 25% of it? is $12\frac{1}{2}\%$ of it? is $33\frac{1}{3}\%$ of it?

3. Find 20% of the following: \$80, 60 miles, 300 sheep, 45 days, 75 bu. of wheat.

4. Express the following fractions as per cent.:

$$\frac{6}{100},\ \frac{9}{100},\ \frac{7}{10},\ \frac{9}{50},\ \frac{1}{2},\ \frac{1}{4},\ \frac{1}{8}.$$

5. Find 5 per cent. of \$400; of 400 cattle; of 800 miles.

6. Find .02 of \$650; .05 of \$80; .12 of 100.

7. Find 5% of \$40; 7% of 300 fish; 8% of 350 acres.

8. Express the following as common fractions and as decimals:

3%, 5%, 12%, 20%, 25%, 30%, 40%.

9. If I spent 25% of my money on Monday and 35% of it on Tuesday, how much do I have left?

10. A man divided his farm among his four sons. To the youngest he gave 15%, to the next 20%, and to the next 25%. What per cent. did he give to the eldest?

EXERCISE 97

1. *A* gained 25% on an investment of $360. How much did he gain?

2. Wood bought at $4 a cord was sold at a gain of 50%. How much was gained on each cord?

3. A man bought a horse for $240 and sold him at a loss of 30%. How much did he lose?

4. A farmer raised 425 bushels of potatoes and reserved 12% for his own use. How many bushels did he reserve?

5. A man bought land at $20 an acre and sold it at the end of 5 years at an advance of 60%. How much did he gain on each acre?

6. If I borrow $250 and pay 6% a year for the use of it, how much do I pay for its use each year?

7. A clerk has a salary of $1200 a year. He spends 80% of it. How much does he save?

8. In a school of 500 pupils, 48% are boys. How many girls are there?

9. A man's income is $2400 a year. He pays 15% of this for rent. How much rent does he pay?

10. On a sheep-ranch there are 3500 sheep. The owner sells 40% of them. How many does he keep?

EXERCISE 98

1. What per cent. of anything is $\frac{1}{2}$ of it? $\frac{1}{4}$ of it? $\frac{1}{5}$ of it? $\frac{1}{8}$ of it? $\frac{1}{10}$ of it? $\frac{3}{10}$ of it? $\frac{2}{5}$ of it?

2. What per cent. of my salary is $\frac{1}{6}$ of it? $\frac{1}{8}$ of it? $\frac{3}{8}$ of it? $\frac{5}{8}$ of it? $\frac{7}{8}$ of it?

3. What part of $10 is $5? What per cent. of $10 is $5?

4. What part of 15 is 3? What per cent. of 15 is 3?

5. What per cent. of 24 is 6? is 8? is 12? is 16?

6. Give the per cent. equivalent to the following:

$\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{25}$, $\frac{1}{20}$.

7. Give the fractions equivalent to the following:

20%, 25%, $12\frac{1}{2}$%, $37\frac{1}{2}$%, $33\frac{1}{3}$%, $66\frac{2}{3}$%.

8. From a web of cloth, 12 yards or 10% of the web have been sold. How many yards were in the web?

9. If a miller takes out 4 quarts for every bushel that he grinds, what per cent. of toll does he take?

10. What per cent. of a number is $\frac{3}{4}$ of it? $\frac{1}{8}$ of it? $\frac{7}{10}$ of it? $\frac{5}{8}$ of it? $\frac{2}{5}$ of it? $\frac{7}{25}$ of it?

EXERCISE 99

1. I sold a lot which cost me $200 for $250. What was my gain per cent.?

2. A watchmaker sells watches at $1\frac{1}{4}$ times their cost. What is his gain per cent.?

3. Eggs are bought at 15 cents a dozen and sold at 20 cents a dozen. Find the gain per cent.

4. A wholesale firm sold a dozen overcoats for $300. They cost $15 each. Find the gain per cent.

5. A merchant sold goods for $72 that cost him $60. Find his gain per cent.

6. A quantity of goods costing $500 were damaged and were sold for $300. Find the loss per cent.

7. A farmer who owns a quarter-section of land has 100 acres in wheat. What per cent. of his farm is in wheat?

8. An apple-woman bought apples at 60 cents a hundred and sold them at 1 cent apiece. What per cent. did she gain?

9. A bill of goods for $500 was paid by giving $450. What per cent. was deducted from the bill?

10. From a cask containing 42 gallons of vinegar, 14 gallons were sold. What per cent. was unsold?

EXERCISE 100

1. How many pounds of butter-fat are there in 4000 pounds of milk which tests 4%?

2. A farmer has a herd of 20 cows which give 3000 pounds of milk in a week. It tests 5% of butter-fat, the price of which is 20 cents a pound. How much is the butter-fat worth per week?

3. A farmer sold 75% of his land and had 40 acres left. How much land had he at first?

4. A rancher had 5000 sheep but lost 16% of them in a blizzard. How many had he left?

5. In a school of 40 pupils, 10% are absent. How many are present?

6. If 5% is deducted from a bill of $8, how much will pay the bill?

7. In an apple-orchard of 400 trees, $37\frac{1}{2}$% are not bearing fruit this year. How many trees have fruit?

8. A farmer owning a half-section of land lays out 40% of it in village lots. How much does he continue to farm?

9. A merchant bought tea at 50c. a pound but owing to its being damaged in transit sold it at a loss of 20%. How much did he receive a pound for it?

10. A farmer had 24 sheep killed by dogs. This was 8% of his flock. How many sheep had he left?

EXERCISE 101

1. After diminishing a number by 25% of itself, what part remains? by $12\frac{1}{2}\%$? by $33\frac{1}{3}\%$?

2. A house was sold for $4800 at a loss of 20%. Find its cost.

3. After taking away 10% of a number, the remainder is 45. Find the number.

4. A number diminished by $33\frac{1}{3}\%$ of itself becomes 42. Find the number.

5. A coal dealer raised the price of coal 30c. per ton, and by so doing gained 50% instead of 40%. How much did the coal cost him per ton?

6. By selling hay at $11 a ton, a gain of $37\frac{1}{2}\%$ is made. How much did the hay cost per ton?

7. A drover sold cattle at $30 a head, at a gain of 20%. Find the cost price.

8. The wheat in an elevator at Fort William is sold at $1.10 a bushel at a gain of 25%. Find the cost price.

9. A train has its speed increased by $12\frac{1}{2}\%$ and then runs 36 miles an hour. What was its former rate?

10. A farmer sold a horse for $200 at a gain of 25%. What per cent. would he have gained or lost by selling him for $180?

EXERCISE 102

1. Six per cent. of a quantity is $12. Find the quantity.

2. Forty per cent. of a quantity is 8 miles. Find the quantity.

3. Nine acres is 3% of a man's farm. How many acres are there in the farm?

4. After diminishing a number by $\frac{3}{5}$ of itself, what per cent. of the number remains?

5. A man sold parts of his farm to two different men; to one he sold $\frac{1}{4}$ of it and to the other $\frac{1}{5}$ of it. What per cent. of the farm did he sell and what per cent. of it has he left?

6. A farmer sold 12 head of cattle. This was $16\frac{2}{3}\%$ of his entire stock. How many cattle had he before the sale?

7. A number increased by 20% of itself is 84. Find the number.

8. In a school there are 40 pupils of whom 18 are boys. What per cent. are girls?

9. A drover purchased 375 head of cattle and sold 150 of them. What per cent. of them did he sell?

10. A farmer has $12\frac{1}{2}$ a. of swale on his farm. This is $2\frac{1}{2}\%$ of his entire farm. How many acres does he own?

11. The average daily attendance at a school for the month of June, 1910, was 96% of the number on the roll. The number on the roll being 450, find the average attendance.

12. Having $250, I paid 30% of it for board, 20% for clothing, and 16% for other expenses. How much money had I left?

EXERCISE 103

1. $33\frac{1}{3}\%$ of the first of two numbers is equal to 25% of the second. What per cent. is the first number of the second?

2. 80% of \$250 is $62\frac{1}{2}\%$ of what sum?

3. A merchant sold goods for \$560, but is able to collect only 80% of the sum. How much did he collect?

4. $12\frac{1}{2}\%$ is added to a number. What per cent. subtracted from the increased number will give the original number?

5. Find the difference between 40% of 2200 and 60% of 1500.

6. If I have \$600 in the bank and draw out $16\frac{2}{3}\%$ of it, how much remains?

7. A man is 64 years old; $12\frac{1}{2}\%$ of his age is $33\frac{1}{3}\%$ of the age of his son. How old is his son?

8. A bicycle dealer gets for 2 bicycles exactly what 3 cost him. How much does he gain per cent.?

9. A train which runs 30 miles an hour has its rate increased $6\frac{2}{3}\%$. How far will it run in two hours at the increased rate?

10. Water expands 10% in freezing. By what per cent. does ice contract in melting?

11. A man paid \$45 for a watch, which was 25% less than its value, and he sold it for 25% more than its value. What per cent. did he gain?

12. In a certain transaction a merchant lost 15% of the money he had invested and had then \$680 left. How much money did he invest?

APPLICATIONS OF PERCENTAGE

(*a*) Trade Discount

EXERCISE 104

1. Find the discount off the following bills:
   (*a*) Invoice price $500, discount 20%.
   (*b*) Invoice price $360, discount 33⅓%.
   (*c*) Invoice price $88, discount 25%.

2. Find the net price of goods bought as follows:
   (*a*) Invoice price $160, discount off 25%.
   (*b*) Invoice price $250, discount off 20%.
   (*c*) Invoice price $420, discount off 16⅔%.

3. The rate of discount is 25% and the discount is $10. Find the invoice price of the goods.

4. The invoice price was reduced by 33⅓% and the bill was then $28. What was the invoice price?

5. The rate of discount being 25% and the discount being $40, find the invoice price of the goods.

6. The net price of goods is $240. The rate of discount being 33⅓%, find the invoice price.

7. The net price of goods is $200; the invoice price is $250. Find the rate of discount.

8. Find the rate of discount when $228 will pay for a bill of goods for $240.

9. What is the marked price of cloth when 27c. pays for a yard after allowing a discount of 10%?

10. The net price of goods is $24; the rate of discount is 20%. Find the invoice price.

EXERCISE 105

1. Find the discount off a bill of goods, invoiced at $400, discount 25%.

2. Find the discount off a bill of goods, invoiced at $330, discount 33⅓%.

3. What is the net price of a bill of goods, invoiced at $450, discount 10%?

4 The discount off a bill of goods is $70; the rate of discount is 20%. What is the total amount of the bill?

5. The rate of discount is 16⅔% and the discount is $35. Find the net price of the goods.

6. The net price of a bill of goods is $250; the rate of discount is 33⅓%. Find the gross amount of the bill.

7. If the invoice price of goods is $280 and the discount $40, find the rate of discount.

8. If the gross price of goods is $560 and the net price $420, what is the rate of discount?

9. What is the total discount off a bill of goods amounting to $400 and subject to successive discounts of 20% and 10%?

10. The gross amount of a bill of goods is $300, subject to successive discounts of 33⅓% and 25%. What is the net amount of the bill?

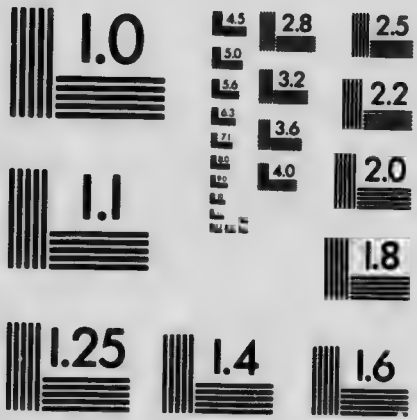
EXERCISE 106

1. The discount off a bill is $27; the rate of discount is 25%. Find the bill.

2. The discount off a bill of goods is $45; the rate of discount is 20%. Find the net price of the goods.

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



APPLIED IMAGE Inc

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Rochester, New York 14609 USA
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(716) 288 - 5989 - Fax

3. I am charged $2.50 for a book, which the bookseller says is 33⅓% less than it cost him. Find the cost.

4. What single discount is equivalent to 25%, 20%, and 10% off?

5. A bookseller wishes to mark a book which cost $2 that he may allow a discount of 25% and still make a profit of 20%. What must be the marked price?

6. A dealer bought a book, list price $1, at a discount of 25%, and afterwards sells the book at $1. What per cent. does he gain?

7. At what price are goods listed that sell for $18, after allowing 20% and 10% off?

8. An invoice was $50, trade discount 20% and 5% off. Find the cost of the goods.

9. What is the difference on a bill of $100 between a discount of 50% and a discount of 30%, and 20%?

10. A man paid $50 for goods at 37½% off. Find the list price.

(*b*) Profit and Loss

EXERCISE 107

1. A merchant bought flour at $6 a barrel and sold it at $7.50 a barrel. Find his gain per cent.

2. A lot that cost $320 was sold for $280. Find the loss per cent.

3. A man sold a house for 1¼ times what he gave for it. Find his gain per cent.

4. A man sold a horse for $96, which was ⅘ of what he paid for it. Find his loss per cent.

5. Cloth which cost 80c. a yard is sold at $1.20 a yard. Find the gain per cent.

6. A grocer sells 8 lb. of tea for what 10 lb. cost. Find his gain per cent.

7. I sold a lot for $400, thereby gaining $120. Find the gain per cent.

8. When cloth is bought at $1.20 per yard and sold at $1 per yard, how much per cent. is the loss?

9. If I buy paper at $4 a ream, and sell it at 25c. a quire, what is the gain per cent.?

10. A flock of sheep increased from 96 to 168 in a year. How much was the increase per cent.?

EXERCISE 108

1. Bought cloth at 32c. a yard and sold it at a gain of 25 per cent. Find the selling price.

2. A grain merchant bought wheat at 90c. a bushel and sold it at a loss of $6\frac{2}{3}\%$. Find the selling price.

3. A merchant marked down a lot of old goods $12\frac{1}{2}\%$. What will be the price of goods for which his price had been $3.20?

4. A lot costs $600 and is sold to gain $33\frac{1}{3}\%$. Find how much is gained and also the selling price.

5. At what price must goods which cost 54c. be sold to lose $16\frac{2}{3}\%$?

6. A farm was bought for $6000 and sold within a year at an advance of 15%. How much was gained and what was the selling price?

7. A merchant buys hats at $15 a dozen and retails them at 40% gain. Find the selling price of a hat.

8. A city lot was bought at $120 a foot frontage and sold at an advance of 100%. Find the selling price.

9. A cargo of coal which cost $525 was sold at a gain of 12%. For how much was it sold?

10. How many sheep must I buy at $7.50 each, so that by selling at a gain of 20% I may make a profit of $30?

EXERCISE 109

1. A grocer bought coffee so that he could sell it at 36c. a pound and make a profit of $33\frac{1}{3}$%. Find the cost price.

2. By selling cotton at 14 cents a yard, there is a gain of $16\frac{2}{3}$%. What was the cost price?

3. *A* sells a lot of dry goods for $60, at 20% above cost. What did the goods cost him?

4. A merchant sold a store-worn coat for $14 and thereby lost 30%. Find the cost of the coat.

5. A tailor paid 80 cents for making a vest. This was 20% of the cost of the cloth. What was the cost of the cloth?

6. A horse was sold for $180 at a loss of 10%. Find the cost price.

7. *A* sold a town lot to *B* and gained 25%. *B* sold it to *C* for $225 and lost 10%. How much did the lot cost *A*?

8. By selling coffee at 30 cents a pound, there is a loss of 25%. What selling price would have gained 25%?

9. A merchant gains 30% by selling muslins at 39c. a yard. By what selling price would he lose 40%?

10. By selling cloth at 65c. a yard 30% was gained. What selling price would have gained 60%?

EXERCISE 110

1. If a dealer in tea always gets for 4 pounds of tea as much as 5 pounds cost, what per cent. does he gain?

2. How much was paid for a piano catalogued at $400, if a discount of 25% was deducted, and another discount of 20% from the remainder?

3. How must a coat that cost $30 be marked so that there may be a profit of 20% after a discount of 10% from the marked price has been allowed?

4. By selling a horse for $140 I gain $16\frac{2}{3}\%$. For what price should I sell it to gain 20%?

5. A merchant bought broadcloth at $4 a yard and marked it at an advance of 20%, but finally took 20% off the marked price and then sold it. What was the selling price?

6. At what must I mark goods that cost 60c. a yard, so that I can take off 20% for a customer and neither gain nor lose?

7. If 10% more is gained by selling a lot for $260 than by selling it for $240, find its cost price.

8. At what must goods that cost 96c. per yard be marked so that I can take off 20% for a customer and yet have 25% profit?

9. Two fur muffs were sold at $36 each. On one 20% was gained; on the other 20% was lost. How much was the gain or loss?

10. By selling a town lot for $80 less than cost there was a loss of 10%. For how much should it have been sold to gain 25%?

(*c*) Commission

EXERCISE 111

1. A collector gets 7% commission and collects $300. How much does he get for his services?

2. An agent sells a lot for $750 and gets 4% commission. How much does he receive for his services?

3. An agent bought goods to the value of $3600 on a commission of 2½%. How much did he receive for his services?

4. An agent collected 80% of a debt of $2500 at 5% commission. How much did he receive for his services?

5. A commission merchant bought $850 worth of pork on a commission of 3%. How much did he receive for his services?

6. An auctioneer sold a farmer's effects to the value of $5200 at a commission of 2½%. How much did he receive for his services?

7. An agent sold property on a commission of 4% and paid the principal $4800. How much was his commission?

8. An agent sold 400 barrels of flour at $6 a barrel. Find the commission at 2½%.

9. *A* sent to his agent $6300 with which to purchase goods after deducting his commission at 5%. How much was his commission?

10. A broker sold $5000 bank stock on a commission of ¼%. How much did the broker receive for his services?

EXERCISE 112

1. For collecting a debt of $240, an agent charged $12. What was his rate of commission?

2. The commission on a sale of goods for $400 was $16. What was the rate of commission?

3. My agent charged me $36 for collecting $450. What is the rate of commission?

4. An agent received $4200. He invested $4000, and kept the rest for his commission. What rate per cent. did he charge?

5. An agent received $100 for selling 400 barrels of flour at $7.50 per barrel. Find his rate of commission.

6. A bank charged $6 for collecting a draft on Liverpool for $1500. At what rate was the charge made?

7. An agent sold a lot in Toronto for $2500, and charged $100 for his services. What rate per cent. did he charge?

8. A commission merchant sold goods for $800 and sent the principal $780. What rate of commission did he charge?

9. An agent sold a lot of 50 feet frontage at $200 a foot and charged $350 for making the sale. What rate of commission did he charge?

10. An agent received $72 for selling 800 barrels of apples at $4.50. Find his rate of commission.

11. How much shall I have to send my agent in order that he may purchase for me 800 bu. of wheat at $1.10 a bushel, after deducting his commission of 5%?

EXERCISE 113

1. An agent's commission is $40 for selling goods, and the rate he charges is 4%. Find the value of the goods.

2. A commission merchant received $45 for buying goods on a commission of $2\frac{1}{2}\%$. Find the price at which the goods were bought.

3. An auctioneer received $135 for selling a farmer's stock at $2\frac{1}{2}\%$ commission. What was the stock sold for?

4. An agent's commission at $2\frac{1}{2}\%$ for selling a house was $500. For how much was the house sold and how much did the owner receive?

5. An agent sold cotton on a commission of $3\frac{1}{3}\%$ and received $400 for his services. For how much was the cotton sold?

6. An agent who charged $2\frac{1}{2}\%$ commission sold lumber and received $80 for his services. What was the value of the lumber sold?

7. Find the sum for which goods were sold when the commission at $3\frac{1}{3}\%$ is $60.

8. An agent sold the lumber cut by a mill one season on a commission of 2%. His total commission was $3400. What was the value of the lumber cut by the mill that season?

9. An agent bought wheat on a commission of $\frac{1}{2}\%$. He charged $35. Find the value of the wheat bought.

10. I sent my agent a sum of money with which to buy goods on a commission of 5%. His commission was $250. How much money was sent to the agent?

EXERCISE 114

1. An agent collected $\frac{3}{4}$ of a debt of $800, and charged 8% commission on the sum collected. How much did the creditor receive?

2. An agent bought flour at $5 a barrel on a commission of 4%. His commission amounted to $60. How many barrels did he buy?

3. An agent received $300 for buying goods to the value of $4000. Find his rate of commission.

4. The sum of $5250 was sent to an agent with which to purchase goods and pay his commission. The value of the goods purchased was $5000. What rate of commission was charged?

5. A contractor has 25 miles of railway to construct at $8000 a mile. He pays his engineer 2% of the contract price for managing the work. What will the fee of the engineer be?

6. I sent my agent $4200 with which to purchase goods after deducting his commission of 5%. How much did he expend for goods?

7. An agent received $624 to invest in wheat after ...ng his commission at 4%. How much was his ...sion?

8. An agent's commission at $2\frac{1}{2}$% for selling a house amounted to $300. How much was received for the house?

9. At $\frac{3}{4}$% what will it cost to buy a draft on Montreal for $1200?

10. For selling a city lot for $2375 an agent charged 4%. How much did the owner of the lot receive for it?

(*d*) Insurance

EXERCISE 115

1. What sum must be paid for insuring a house for $1600 at $\frac{3}{4}\%$ premium?

2. What premium must be paid for insuring a vessel for $12000 at $1\frac{1}{2}\%$?

3. A house is worth $10000 and is insured for $\frac{3}{5}$ of its value at 1%. Find the premium paid.

4. Find the premium on $760 at $1\frac{1}{4}\%$ and on $540 at $1\frac{1}{3}\%$.

5. A man effected an insurance on his barn and contents for $2500 at $1\frac{1}{8}\%$. How much did he pay?

6. Find the cost of insuring a shipload of cattle worth $12000 for $\frac{3}{5}$ of their value at 2% premium.

7. A farmer insures his live stock for $2400 at a premium of $1\frac{3}{4}\%$. How much did he pay?

8. Find the cost of an insurance policy for $5500 at $1\frac{3}{8}\%$ premium.

9. A ship worth $60000 is insured for $\frac{2}{3}$ of its value at $2\frac{1}{2}\%$. If the ship is wrecked and becomes a total loss, how much do the owners lose?

10. *A* insured his house for a year for $4000 at $\frac{1}{2}\%$ and his furniture for $1600 at $\frac{3}{8}\%$. What was the total premium?

EXERCISE 116

1. If $8 is paid for effecting an insurance of $1200, what is the rate of insurance charged?

2. A farmer paid $35 for insuring a herd of cattle for $2800. At what rate was the insurance effected?

3. The sum charged for a policy of $2400 was $42. At what rate was the premium computed?

4. A house was insured for $2100 for three years; the premium paid was $35. At what rate was the premium charged?

5. A house worth $8000 is insured for $\frac{3}{4}$ of its value at a cost of $90. What is the rate of premium?

6. A produce dealer paid $17 for an insurance on goods for $800. What rate of premium did he pay?

7. A farmer paid $84 for insuring his property for $4800. What was the rate charged?

8. A school house is insured for $7500, and the premium is $90. Find the rate of insurance.

9. A merchant paid $40 for insuring his stock of goods worth $9000 for $\frac{2}{3}$ of their value. What was the rate of insurance?

10. The sum of $300 was paid for the insurance, at $\frac{1}{3}$ of its value, of a factory worth $25000. What rate of premium was charged?

EXERCISE 117

1. The premium paid for insuring a house at $1\frac{1}{2}\%$ was $48. What is the amount of the policy?

2. The premium for insuring a barn and its contents at $\frac{1}{2}\%$ is $24. For what sum is the policy drawn?

3. A merchant paid $125 for the insurance of a cargo of wheat at $1\frac{1}{4}\%$. For what sum was it insured?

4. A farmer paid a company $9 for insuring his cattle at $\frac{1}{2}\%$ premium. For what amount did he insure the cattle?

5. A farmer insures his house for $\frac{3}{4}$ of its value at $\frac{1}{4}\%$ premium. He paid $14 for the insurance. Find the value of the house.

6. A shipment of horses was insured at $80 apiece at $1\frac{1}{2}\%$ premium. The sum paid for the insurance was $120. How many horses were there?

7. The premium at $\frac{1}{8}\%$ for insuring goods was $20. Find the amount of the policy.

8. It cost $27 to insure my house for $\frac{3}{4}$ of its value at a premium of $\frac{3}{4}\%$. What was its value?

9. At $\frac{1}{8}\%$ how much insurance can be effected upon a store for $200?

10. A farmer insured his barn and its contents for $\frac{3}{5}$ of their value at $\frac{3}{4}\%$. The premium paid was $20. Find the value of the barn and its contents.

EXERCISE 118

1. The owner of a house paid $24 for insuring it for $\frac{3}{4}$ of its value at 1% premium. What was the house worth?

2. A barn and its contents together valued at $1800 are insured for $\frac{2}{3}$ of their value at $\frac{3}{4}\%$. Find the premium paid.

3. What sum must be paid for insuring property worth $5000 for $\frac{3}{5}$ of it value at $\frac{1}{2}\%$ premium?

4. The premium at $\frac{1}{2}\%$ on a cargo of goods amounted to $250. The cargo was insured for $\frac{1}{2}$ its value. Find what it was worth.

5. A house worth $2400 was insured at $\frac{1}{2}\%$ for $\frac{3}{4}$ of its value and was totally destroyed. How much did the owner lose?

6. Find the premium on $650 at $\frac{1}{4}\%$ and on $8400 at $\frac{3}{4}\%$.

7. At $\frac{1}{8}\%$ what fraction of the policy is the premium?

8. A merchant paid $20 for insuring goods to the extent of $2500. What was the rate of insurance?

9. If a policy of $4000 covers both the value of the property and the premium paid at $\frac{3}{4}\%$, what must be the value of the property?

10. A herd of cattle is insured for $\frac{1}{2}$ its value at $\frac{3}{4}\%$ premium. The premium paid was $60. Find the value of the herd.

(*e*) Taxes

EXERCISE 119

1. Find the tax on property assessed for $5500 at 12 mills on the dollar.

2. A teacher's salary is $1300 a year. The rate of taxation is 17 mills on the dollar. If $700 of income is exempt from taxation, how much tax does he pay?

3. Find the duty paid on a consignment of goods invoiced at $4500 and paying 30% duty.

4. Find the duty on 2500 gal. of spirits at $2.40 a gallon.

5. A farm is assessed for $4800. The township rate is 15 mills on the dollar. Find the tax on this farm.

6. If the law exempts $1000 of income from being taxed, find how much *A*, whose salary is $2500, has to pay when the rate of taxation is 15 mills on the dollar.

7. The sum of $4900 is to be raised in a township. How much must be levied, if the cost of collection is 2%?

8. A nurseryman imported 1750 shrubs upon which he paid a specific duty of 3c. a shrub. How much was the duty?

9. A wholesale merchant imported silk velvets invoiced at $7580. Find the duty at 30%.

10. In a certain township the rate of taxation is 9 mills on the dollar. Find *A*'s tax, who owns 340 acres of land assessed at $50 an acre.

EXERCISE 120

1. What is the rate of taxation when property assessed for $4000 pays a tax of $60?

2. What is the duty on window glass when a consignment invoiced at $488 pays a duty of $61?

3. What is the rate of taxation when $120 is the tax on property assessed for $9600?

4. Find the rate of taxation when $28 is the tax on $1600.

5. A consignment of leather, invoiced at $4000, paid $700 duty. At what rate was the duty charged?

6. The specific duty on 6000 gal. of wine was $1200. At what rate per gallon was the duty charged?

7. A miller imported a cargo of wheat of 30000 bushels. He paid a specific duty amounting to $3600. At what rate per bushel was the duty charged?

8. A foundryman imported 4000 tons of pig-iron upon which he paid a specific duty of $9000. Find the rate of duty on pig-iron per ton.

9. Find the rate of taxation in a township when a man who owns 350 acres of land assessed at $20 an acre pays $84 in taxes.

10. In a certain municipality *A* pays a tax of $44 on an assessment of $4000. Find *B*'s tax, who is assessed for $6200 in the same township.

EXERCISE 121

1. What is the assessed value of property upon which the tax is $12, at the rate of 10 mills on the dollar?

2. A farmer paid a tax of $60 on property where the rate of taxation was $1\frac{1}{2}\%$. Find the assessed value of his property.

3. What is the invoice cost of goods upon which the duty is $96 at 25%?

4. The tax on a lot in an incorporated village, where the rate is 2 cents on the dollar, is $25. Find the assessed value of the lot.

5. In a town the tax rate is 18 mills on the dollar; *A*'s income tax is $36. What is *A*'s income, $1000 of it being exempt?

6. How many gallons of wood alcohol were imported upon which the duty collected, at $2.40 a gallon, was $1200?

7. A miller paid $5400 duty upon an importation of wheat at 12c. a bushel. How many bushels of wheat did he import?

8. An importer of silks paid a duty of $2250. The duty being charged at 30%, find the value of the silks.

9. Two farmers live in the same township. One is assessed for $4500 and pays $36 in taxes; the other pays $52 in taxes. For how much is the property of the latter assessed?

EXERCISE 122

1. Find the tax on $6000 at 15 mills on the dollar.

2. What is the rate of taxation when property assessed at $4000 pays $52?

3. When the rate of taxation is 18 mills on the dollar, and a man's taxes amount to $54, if $800 is exempt, what is his income?

4. What is a man's tax, whose property is assessed at $5000, when the rate is $1\frac{1}{5}\%$?

5. Find the duty on 400 yds. of tweed, valued at $1.25 per yard; rate of duty 30%.

6. Find the total duty on 600 lbs. of wool, valued at 35c. per pound, subject to an ad valorem duty of 10% and a specific duty of 5c. per pound.

7. What is the total excise duty on 400 lbs. malt at $1\frac{1}{2}$c. per pound, 500 gallons of vinegar at 4c. per gallon, and 200 lbs. tobacco at 3c. per pound?

8. What must be the assessed value of property in order to raise a net amount of $1900 after paying 5% for collecting; rate of taxation 2%?

9. What is the invoice price of goods on which $66 duty is paid at the rate of 30%?

10. What is the assessed value of property upon which the tax is $30, the rate of taxation being $2\frac{1}{2}\%$?

(*f*) Miscellaneous Exercises in Percentage

EXERCISE 123

1. What part of a number is $37\frac{1}{2}\%$ of it?

2. What per cent. of a number is $\frac{1}{3}$ of it?

3. A man bought a horse for \$145, and paid 40% of it in cash and the balance by note. Find the amount of the note.

4. The tax on a lot worth \$500 is \$6. What is the rate on the dollar?

5. What will it cost to insure \$2400 worth of furniture at $\frac{3}{8}\%$ premium?

6. Bought cloth at 80c. a yard and sold it at \$1.10. Find the gain per cent.

7. A man sends his agent \$630 with which to buy goods, after deducting his commission of 5% on the price paid for the goods. Find the agent's commission.

8. A man received \$45 for selling goods on a commission of $2\frac{1}{2}\%$. Find the price at which the goods sold.

9. Silk which cost \$2.40 the yard is marked at 20% loss. Find the selling price.

10. A grocer bought coffee so that he could sell it at 36 cents, and make a profit of $33\frac{1}{3}\%$. Find the cost.

EXERCISE 124

1. What per cent. is equivalent to each of the following:

$\frac{9}{10}$, $\frac{3}{20}$, $\frac{3}{8}$, $\frac{7}{25}$, $\frac{9}{50}$, $1\frac{1}{2}$, $2\frac{1}{4}$.

2. Find the number of which 18 is 6%; 45 is 9%; 36 is $2\frac{1}{4}$%; 6 is $\frac{1}{2}$%.

3. For collecting accounts an agent charges a commission of 5%. Find his commission for collecting \$450.

4. Find the duty on 5 carriages invoiced at \$120 each the duty being 35%.

5. What is the list price of knives for which the retail merchant pays \$6 a dozen after a discount of $33\frac{1}{3}$% is deducted?

6. A man's salary is \$2500. If \$1000 is exempt from taxation, what amount of taxes will he be required to pay at the rate of 16 mills on the dollar?

7. A book agent receives 25% on his sales. Find his commission for selling 8 sets of books at \$25 a set.

8. A farmer bought a horse for \$150 and sold it so as to gain \$30. How much was the gain per cent.?

9. For selling \$6400 worth of goods an agent received \$192 as commission. What rate was charged?

10. If $12\frac{1}{2}$% is gained by selling a sewing machine for \$27, for what should it be sold to gain $16\frac{2}{3}$%?

EXERCISE 125

1. Find the per cent. equivalent for each of the following: .06, .75, .125, .0925, .085, 1.5, 3.35.

2. Find the following: 25% of 76; $33\frac{1}{3}$% of 120; $12\frac{1}{2}$% of 344; $16\frac{2}{3}$ of 366.

3. At $2\frac{1}{4}$% what is an agent's commission for selling a house and lot for \$6000?

4. Find the duty on 360 barrels of apples at 40c. a barrel.

5. Goods for which the catalogue price is $75 are sold to a retail merchant for $50. What is the rate of discount?

6. What is the rate of taxation when the taxes on property assessed for $3600 are $54?

7. A broker received $36 for purchasing goods on a commission of $2\frac{1}{4}\%$. What was the value of the goods bought?

8. The cost of a farm was $4500. It was sold for $5400. Find the gain per cent.

9. In a library there are 6300 volumes, of which 900 are fiction. What per cent. of the library is fiction?

10. Find the duty on 800 lbs. of steel rivets invoiced at 6c. a pound, the duty being 75c. a 100 lbs. and 25% ad valorem.

EXERCISE 126

1. What vulgar fraction is equivalent to each of the following:

$$4\%,\ 7\tfrac{1}{2}\%,\ 12\tfrac{1}{2}\%,\ 16\tfrac{2}{3}\%,\ 8\tfrac{1}{3}\%?$$

2. What per cent. is each of the following: 5 of 20? $8 of $48? 16 boys of 128 boys?

3. Find the number of which 16 is 50%; 25 is $12\frac{1}{2}\%$; 40 is $\frac{1}{2}\%$; 36 is $\frac{1}{3}\%$.

4. A real estate agent charges $2\frac{1}{2}\%$ of the annual rent for renting houses. What is his commission for renting a house at $20 a month?

5. A manufacturer gives 25% and 10% discount. Find the net price of knives invoiced at $8 a dozen.

6. A customer paid $3.50 for an article of which the marked price was $4. What rate of discount did he receive?

7. A commission merchant bought goods for $560 and received $14 as his commission. What rate was charged?

8. Goods damaged by fire were sold at a loss of 25%. If the total loss was $1450, find the original value of the goods.

9. An agent sold 500 barrels of apples at $3 a barrel on a commission of $3\frac{1}{3}\%$. How much did his principal receive?

10. A merchant insured his stock for $\frac{3}{4}$ of its value at $1\frac{1}{2}\%$. The premium was $60. What was the value of the stock?

(*g*) Interest

EXERCISE 127

1. Find the interest on $750 for 1 year at 6%.

2. What is the interest on $800 for 9 mo. at 5% per annum?

3. Find the amount of $1200 for one year at $5\frac{1}{2}\%$ per annum.

4. A man borrows $3600 for 3 mo. at 6% per annum. What sum must be returned at the end of the period?

5. Find the interest on $50 for 6 mo. at 6% per annum.

6. What is the amount of $80 for 9 mo. at 6% per annum?

7. At 6% per annum, what part of the principal is the interest for 4 mo.?

8. What part of the principal is the interest for 6 mos. at 6% per annum?

9. Find the interest on $350 for 8 mos. at 6% per annum.

10. To what part of the principal is the interest equal in 1 yr. 3 mos. at 8% per annum?

EXERCISE 128

1. At what rate per annum will $120 give $6 interest in 1 year?

2. At what per cent. per annum will $400 give $12 interest in 6 mos.?

3. At what rate per cent. per annum will $300 in 9 mos. make $18?

4. At what rate per cent. per annum will $2500 make $250 interest in 15 mos.?

5. What is the rate per cent. per annum when the interest on $450 for 1 yr. is $27?

6. At what rate per cent. per annum will $250 amount to $260 in 6 mos.?

7. The interest on $540 for 8 mos. is $18. Find the rate per cent. per annum.

8. When the interest for 1 yr. is $\frac{2}{25}$ of the principal, what is the rate per cent. per annum?

9. When the interest for 9 mos. is $\frac{3}{50}$ of the principal, what is the rate per cent. per annum?

10. The interest is $\frac{3}{40}$ of the principal in 15 mos. What is the rate per cent.?

EXERCISE 129

1. The interest on $200 for a certain time at 6% per annum is $9. Find the time.

2. In what time will $50 make $2 interest at 8% per annum?

3. *A* lent *B* $25[illegible] at 6% per annum; *B* paid his debt by giving *A* $270. [illegible] or how long was the money lent?

4. In what time will $450 at 10% per annum give $30 interest?

5. In what time will the interest be $\frac{3}{50}$ of the principal at 8% per annum?

6. In what time will the interest be $\frac{3}{50}$ of the principal at 9% per annum?

7. In what time will $500 yield $45 interest at 6% per annum?

8. The amount of $800 for a certain time at 7% is $870. Find the time.

9. In what time will $180 yield $30 interest at 5% per annum?

10. The principal is $550; the amount is $616, and the rate per cent. per annum is 8. Find the time.

EXERCISE 130

1. The interest on a sum for 1 yr. at 6% per annum is $24. Find the sum.

2. What principal in 6 mos. at 8% per annum will give $12 interest?

3. What principal in 15 mos. at 6% per annum will give $15 interest?

4. The interest on a note for 9 mos. at 9% per annum is $18. Find the note.

5. What principal in 1 yr. is sufficient to gain $20 interest at 8% per annum?

6. What sum of money at 6% per annum will produce $50 in 20 mos.?

7. What principal in 2 yrs. at 10% per annum will produce $90 interest?

8. What principal will yield $96 interest in $2\frac{2}{3}$ yrs. at 6% per annum?

9. What sum put to interest at 8% per annum for $1\frac{1}{2}$ years will give $42 interest?

10. The interest on a sum of money for 2 years at $7\frac{1}{2}$% per annum is $60. Find the sum.

EXERCISE 131

1. What part of the principal is the amount in 1 yr. at 6% per annum?

2. What part of the principal is the amount in $1\frac{1}{2}$ yrs. at 8% per annum?

3. Find the amount of $500 for 1 yr. at 6% per annum.

4. To what sum will $450 amount in $1\frac{1}{2}$ yrs. at 8% per annum?

5. What fraction of the principal will the amount be in 16 mos. at 9% per annum?

6. Find the amount of $3000 for $1\frac{1}{2}$ yrs. at 10% per annum.

7. A note of $350 runs for 6 mos. at 8% per annum. What sum will discharge the note?

8. Find the amount of $560 for 3 mos. at 7% per annum.

9. What sum will discharge a promissory note for $450 due in 18 mos. at 8% per annum at the time of its maturity?

10. The amount of a certain principal for 3 years at a certain rate per cent. per annum is $620, and for 4 yrs. is $660. Find the principal and the rate.

EXERCISE 132

1. What principal will amount to $260 in 6 mos. at 8% per annum?

2. What principal in 4 yrs. at 5% per annum will amount to $96?

3. A sum of money put to interest at 6% for 18 mos. amounts to $327. Find the sum.

4. Find the principal that amounts to $265 in 8 mos. at 9% per annum.

5. The interest of a sum of money at a certain rate and for a certain time is $\frac{1}{24}$ of the principal. What part of the principal is the amount?

6. What part of the principal is the amount for $2\frac{1}{2}$ years at 8%?

7. What principal will amount to $560 in 18 months at 8% per annum?

8. What principal will amount to $1080 in 5 years at 7% per annum?

9. A certain sum in 3 yrs. at 6% per annum amounts to $590, and at 7% for the same time to $605. Find the sum.

10. The amount of a certain principal for $3\frac{1}{2}$ years at a certain rate per cent. per annum is $160, and for 4 years it is $165. Find the principal and the rate per cent.

EXERCISE 133

1. At what rate per cent. per annum is the interest on $400 for 9 mos. $21?

2. In what time will the interest of a principal at 8% per annum be $\frac{3}{10}$ of the principal?

3. What sum in 8 mos. at 6% per annum will amount to $780?

4. The interest on a sum for 2 yrs. at 5% is $20 less than the interest on the same sum for $2\frac{1}{2}$ yrs. at 6%. Find the sum.

5. What principal at $7\frac{1}{2}$% per annum yields $18 interest in 1 year?

6. To what part of the principal is the interest equal in 3 yrs. 6 mos. at 8% per annum?

7. Find the interest on $350 for $3\frac{3}{5}$ yrs. at 6% per annum.

8. What principal will gain $42 in 2 yrs. at 6% per annum?

9. Find what principal in 5 yrs. at 10% per annum will amount to $540.

10. The interest on $240 at a certain rate per cent. for 3 yrs. is $12 less than it is for 4 yrs. Find the rate per cent.

EXERCISE 134

1. At what rate per cent. per annum will the interest on $750 for 8 mos. be $30?

2. If $360 amounts to $369 in half a year, what is the rate per cent. per annum?

3. The amount of $450 at 8% per annum being $477, find the time.

4. Find the amount of $540 at 6% per annum for 6 mos.

5. If I borrow $250 and at the end of a year return $270, what is the rate of interest per annum?

6. The interest on a sum of money for 6 mos. at $7\frac{1}{2}\%$ is $4.50. Find the sum of money

7. In what time will $750 amount to $840 at 6% per annum?

8. What principal will produce $40 interest in 1 year at 8% per annum?

9. What principal will amount to $648 in 16 months at 6% per annum?

10. A man pays $22 for the use of $660 for 8 months. What is the rate per cent. per annum?

EXERCISE 135

1. What per cent. of 25 is 15? of 75 is 36? of 50 is 18? of 50 is 45?

2. If 60% of the coal burned in the school furnace during a year is 12 tons, how much coal is burned during the year?

3. A merchant bought 200 barrels of oil. He sold 25% of them at cost, and on the remainder he gained 40%. Find the gain per cent. on the whole.

4. A tax-collector collected $5750, for which he was paid at the rate of 2%. How much was his pay?

5. What principal will yield $198 interest in 9 months at 8%?

6. How much do I owe if the interest on the debt in 6 mos. at 6% per annum is $150?

7. By selling cloth at 45c. a yard a merchant loses 10%. For how much must he sell it to gain 10%?

8. The invoice price of goods was $144 and the net price was $96. Find the rate of discount.

9. *A* sells a lot to *B* and gains 12½%; *B* sells it to *C* for $780 and gains 33⅓%. What did the lot cost *A*?

10. Find the specific duty on 25 gallons of spirits of wine at $2.40 per gallon.

EXERCISE 136

1. A dozen overcoats were sold for $360. They cost $25 each. Find the gain per cent.

2. A bank clerk having $300 began his summer holidays. He spent 15% for travelling expenses, 60% for board, and 10% for sundry expenses. How much money had he remaining?

3. A lot was sold at 85% of its cost, by which there was a loss of $180. Find the cost of the lot.

4. A drover bought cattle at an average cost of $25 each and sold them at an average price of $32 a head. Find his gain per cent.

5. A doctor handed some accounts to an agent to collect. The agent charged $12\frac{1}{2}\%$ and received \$65 for his services. How much was collected?

6. A merchant insured some goods for $\frac{3}{5}$ of their value at $\frac{1}{5}\%$ and paid \$32 as premium. Find the value of the goods.

7. Find the net price of goods, the invoice price being \$80, and discounts of 25% and 10% being allowed.

8. Find the distance of which 12 miles is $7\frac{1}{2}\%$.

9. The sum of two numbers is 510 and one is $12\frac{1}{2}\%$ more than the other. Find the two numbers.

EXERCISE 137

1. What part of the principal is the interest at 8% per annum for 4 years?

2. Find the interest of \$900 for 8 months at 6% per annum.

3. What is the interest on \$800 for 73 days at 5% per annum?

4. What is the amount of \$75 for 5 years at 8% per annum?

5. At what rate will \$80 give \$20 interest in $2\frac{1}{2}$ years?

6. In what time will \$90 make \$10.80 interest at 6% per annum?

7. In what time will \$60 amount to \$69 at 5% per annum?

8. What principal will give \$30 interest in $2\frac{1}{2}$ years at 8% per annum?

MENSURATION

EXERCISE 138

1. How many board feet are there in a board 10 in. wide, 12 ft. long, and 1 in. thick?

2. How many board feet are there in 5 boards 12 in. wide, 12 ft. long, and 1 in. thick?

3. How many board feet are there in a plank 3 in. thick, 12 in. wide, and 16 ft. long?

4. Find the cost of 1000 planks 12 ft. long, 10 in. wide, and 3 in. thick at $36 a thousand.

5. How much lumber is required to fence a rectangular lot 60 ft. frontage and 90 ft. deep with a close board fence 6 ft. high?

6. A town lot 120 ft. by 180 ft. is enclosed by a fence 5 boards high, each board being 6 in. wide. How much lumber is there in the fence?

7. How much lumber, board measure, is there in 100 scantlings 18 ft. long, 4 in. wide, and 4 in. thick?

8. How many board feet are there in a piece of timber 18 ft. long, 10 in. wide, and 8 in. thick?

9. How much will the lumber in the floor of a room 50 ft. by 60 ft. cost at $120 per M?

10. Find the cost of 50 planks each 16 ft. long, 12 in. wide, and 3 in. thick at $50 per M.

EXERCISE 139

1. Find the area of an oblong 18 in. by 16 in.

2. How many square yards of sodding are required for an oblong plot 45 ft. by 90 ft.?

3. Find the cost of sodding an oblong plot 54 ft. by 90 ft. at 12c. a square yard.

4. Find the area of a right-angled triangle whose base is 2 ft. 8 in. long and perpendicular 1 ft. 3 in. high.

5. An oblong is 3 ft. long and has an area of 8 sq. ft. Find the width of the oblong.

6. The side of a square is 16 in. long. Find the area of the square.

7. The base of a triangle is 40 in. long and its area is 360 sq. in. Find its perpendicular height.

8. The sides of a right-angled triangle are 16 in., 30 in., and 34 in. long. Find its area.

9. Find the cost of the linoleum for an oblong room 15 ft. by 24 ft. at $1.20 per square yard.

10. The cost of covering a room with oil-cloth at 80c. a square yard is $64. If the room is 30 ft. long, how wide is it?

EXERCISE 140

1. Find the circumference of a circle whose diameter is 42 in.

2. The radius of a circle is 14 in. Find the length of its circumference.

3. The circumference of a circle is 66 in. Find its radius.

4. Find the area of a circle 14 in. in diameter.

5. The circumference of a circle is 44 in. in length. Find its area.

6. A circle is 21 in. in radius. Find its area.

7. Find the number of cubic inches in a circular plate of metal 2 in. thick and 14 in. in diameter.

8. How many square feet are there in a circular floor 14 ft. in radius?

9. A circular bed of flowers is 35 in. in radius. Find its area.

10. A circular piece of paper 5 in. in radius has a circle 2 in. in radius cut out of it. Find the area of the paper that is left.

EXERCISE 141

1. Find the volume of a rectangular solid 6 ft. long, 4 ft. wide, and $2\frac{1}{2}$ ft. deep.

2. Find the cost of excavating a rectangular cellar 24 ft. long, 18 ft. wide, and 12 ft. deep at 50c. a cubic yard.

3. How many loads of earth were taken out of a basement 36 ft. long, 24 ft. wide, and 12 ft. deep, each load containing a cubic yard?

4. A stick of square timber is 20 ft. long and 1 ft. square. How many cubic feet of timber does it contain?

5. A school room is 30 ft. long, 24 ft. wide, and 12 ft. high, and has seats for 36 pupils. How much breathing space is allowed for each pupil?

6. How many 4-inch cubes will be required to build a cube with an edge a foot long?

7. How many blocks 6 in. long, 4 in. wide, and 3 in. deep can be cut from a cubic foot of wood?

8. What was the cost of digging a cistern 6 ft. long, 6 ft. wide, and 9 ft. deep at 90c. a cubic yard?

9. How many cubic feet of water will a circular cistern 7 ft. in diameter and 8 ft. deep hold?

10. A rectangular cistern 8 ft. square has 384 cu. ft. of water in it. How deep is the water?

EXERCISE 142

1. The circumference of a circle is 88 ft. Find the length of its radius.

2. The area of a triangle is 64 sq. in. It is 16 in. in height. Find the length of its base.

3. A plot for a school garden is 40 ft. long and 30 ft. wide. If there are 24 pupils in the class, find the size of the plot for each pupil.

4. A number of wooden blocks 2 in. by 3 in. by 5 in. exactly filled a case whose inside measurements were 1 ft. by 15 in. by 2 ft. How many blocks were there?

5. How many bricks 4 in. by 8 in. will it take to pave a walk 30 ft. long and 4 ft. wide?

6. Find the size of sheet lead it would require to cover a cubical box of 4 ft. edge.

7. If an inch of rain falls upon a playground which is a square with a side 60 ft., how many cubic feet of water have fallen?

8. A map is drawn to a scale of 1 sq. in. to 1 sq. mile. How many square miles are represented on a map 4 ft. long and 2 ft. 6 in. wide?

9. Find the volume of a block of granite 9 ft. long, 6 ft. broad, and 3.5 ft. thick.

10. What is the atmospheric pressure on a cube of 4 in. edge, supposing the weight of air equals 15 pounds to a square inch?

EXERCISE 143

1. How many square inches of paper will cover the surface of a block of wood in the form of a cube, each edge of which is one foot?

2. A wagon box 8 ft. long and 3 ft. wide holds exactly 1 cubic yard of gravel. How deep is the box?

3. A cabinet-maker bought a plank of black walnut 12 ft. long, 1 ft. wide, and 3 in. thick. He paid 20c. per foot, board measure, for it. How much did it cost him?

4. How much must be paid for mowing a field 64 rods long and 40 rods wide at $2.75 an acre?

5. How many cubic yards of earth must be excavated to make a cellar 33 ft. long, 18 ft. wide, and 8 ft. deep?

6. A pile of wood contains 3 cords. It is 24 ft. long and 4 ft. wide. How high is the pile?

7. The roof of a tower is composed of five equal triangular parts, each having a base of 8 ft. and a slant height of 9 ft. Find the area of the roof.

8. Ice when cut into blocks of a certain size, and well packed, occupies 40 cu. ft. per ton. How many tons of ice can be packed into a space 60 ft. by 40 ft. by 25 ft.?

9. A wagon wheel is $3\frac{1}{2}$ ft. in diameter. How far will the wagon have gone when the wheel has made 300 revolutions?

10. How many cubic feet are there in a block of stone 8 ft. long, 3 ft. 6 in. wide, and 15 in. thick?

EXERCISE 144

1. Find the circumference of a circle whose diameter is 511 in.; $5\frac{3}{5}$ ft.; $4\frac{2}{3}$ rd.

2. Find the diameter of a circle whose circumference is 484 in.; 396 ft.; 682 rd.

3. What is the diameter of a circular silo 33 ft. in circumference?

4. Find the length of the circumference of a copper rod $2\frac{1}{10}$ in. in diameter.

5. What radius must be used in building a water wheel that shall be 44 ft. in circumference?

6. Find the girth of a tree that measures 4 ft. 8 in. in diameter.

7. A water pipe is 14 in. in diameter. Find the area of a cross section of this pipe.

8. A circular silo is 14 ft. in diameter and 20 ft. deep. Find its capacity.

9. A circular cistern 7 ft. in diameter and 8 ft. deep will hold how many cubic feet of water?

10. A horse tethered by a rope 21 ft. long can graze over how many square feet of ground?

EXERCISE 145

1. How many board feet are there in a plank 24 ft. long, 3 in. thick, and 15 in. wide?

2. Find the volume of a rectangular solid 4 ft. square by 5 ft. deep.

3. A ton of hard coal occupies 35 cu. ft. How many tons of such coal will a bin 10 ft. by 7 ft. by 6 ft. hold?

4. A rectangular tank, 8 ft. by 6 ft. by 15 ft. deep, is full of water. How far will the water sink if 360 cu. ft. of water is drawn off?

5. If 32 cu. ft. of water weighs a ton, find the weight of water in a rectangular cistern 10 ft. by 8 ft. by 6 ft.

6. Find the area of the surface of a cube of 8 in. edge.

7. The area of the surface of a cube is 150 sq. in. Find its volume.

8. A silo is in the form of a rectangular prism. Its base is 10 ft. square and it is 18 ft. deep. Find its capacity.

9. A rectangular solid has a square base, a volume of 252 cu. in., and a height of 7 in. Find the length of an edge of its base.

10. A rectangular cistern with a square base has a volume of 392 cu. ft. It being 8 ft. deep, find the length of a side.

EXERCISE 146

1. A barnyard is 40 yds. long by 30 yds. wide, and the manure is 3 ft. deep on the average. How many loads of manure are there in it, each load being 1 cu. yd.?

2. How many cubic yards of concrete are there in a foundation for a barn 60 ft. long, 45 ft. wide, and 8 ft. high?

3. Find the weight of a granite corner-stone 4 ft. square and 2 ft. thick, granite weighing 170 lbs. per cubic foot.

4. A bushel of wheat is nearly equivalent to $1\frac{1}{4}$ cu. ft. How many bushels are there in an elevator bin 10 ft. square and 80 ft. high?

5. How many cubic feet of earth must be rem in digging a well $3\frac{1}{2}$ ft. in diameter and 32 ft. dee

6. If 15 cu. yds. of hay make a ton, how many tons are there in a mow 48 ft. by 30 ft. by 15 ft.?

7. If a ton of soft coal occupies a space of 36 cu. ft., how many tons will a bin 9 ft. long, 6 ft. wide, and 6 ft. deep hold?

8. How long must a bin be to hold 12 tons of soft coal if the bin is 8 ft. wide and 6 ft. deep, there being 36 cu. ft. in a ton?

9. A rectangular hay rick is 21 ft. by 18 ft. by 15 ft. How many tons of hay does it contain, there being 15 cu. yds. in a ton?

10. A postage stamp is 1 in. long and $\frac{3}{4}$ in. wide. How many postage stamps will be required to cover a square foot of surface?

11. A surveyor's chain is 4 rods long. How many acres are there in an oblong field 12 chains long and 10 chains wide?

12. A block of stone 10 ft. long and 6 ft. thick, bought at 50c. a cubic foot, cost $240. How wide was the stone?

13. A cube of copper 4 in. long is rolled into a square sheet 2 ft. long. How thick will the sheet be?

14. At $5 a cord, find the cost of a pile of wood 12 ft. long, 4 ft. wide, and 8 ft. high.

MISCELLANEOUS EXERCISES

EXERCISE 147

1. The sum of $90 is divided between Thomas and James in such a way that when Thomas receives $7 James receives $5. How much does each receive?

2. Three men hired a pasture for $30. *A* put in 4 oxen, *B* 5 oxen, and *C* 3 oxen. How much should each pay?

3. What is the value of a pound of a mixture of coffee composed of 6 lb. at 27c. and 2 lb. at 19c.?

4. Find the cost of sending a telegram of 56 words at 25c. for the first 10 words and 1c. for each additional word.

5. If 21 shantymen have provisions for 24 days and 7 more men arrive, how long will the provisions now last?

6. Smith bought three loads of coal. The first weighed $1\frac{1}{2}$ t., the second $1\frac{1}{4}$ t., and the third $1\frac{5}{12}$ t. How much coal did he buy?

7. If two boys can shovel some snow in 6 days and the first boy alone can do it in 10 da., in what time can the second boy do it?

8. The average of 5 numbers is 12.5. Find the difference between their aggregate and 90.

9. A tailor bought cloth at $2.25 per yard, and sold it at $3 per yard. What per cent. did he gain on his outlay?

10. The selling price of an article was $35.35 and the gain was $16\frac{2}{3}\%$ of the cost. Find the cost.

EXERCISE 148

1. Divide 54 into two parts, the larger of which is $4\frac{1}{8}$ times the smaller.

2. Two numbers are to each other as 3 to 4 and their sum is 56. Find the numbers.

3. If a flagstaff 40 ft. high casts a shadow 25 ft. long, how long a shadow will be cast at the same time by a pole 24 ft. high?

4. If 7 men can build 8 rods of wall in 4 days, in how many days will 14 men build 32 rods of wall?

5. A contractor employed a number of men at $\$2\frac{1}{2}$ per day, and the same number of boys at $\$1\frac{3}{4}$ per day. Their daily pay amounted to \$52. How many of each were employed?

6. How must cloth that cost 48c. a yard be marked to make a profit of 25% after allowing a discount of 20%?

7. *A* can build a wall in 10 days and *B* can build it in 12 days. After *A* had worked at it for 2 days and *B* for 3 days, what per cent. of the wall was built?

8. From a pile of wood containing 60 cords, $7\frac{1}{2}$ cords were sold to one man and $10\frac{1}{3}$ cords to another. How many cords were left?

9. What will it cost to lay a pavement 60 ft. long and 6 ft. wide, at 35c. a square yard?

10. Divide 755 into two parts which shall have to each other the ratio of 2 to 3.

11. Find the interest on \$2400 for 6 months at $6\frac{1}{2}$ per cent. per annum.

EXERCISE 149

1. If $150 gain $9 in a year, in what time will $200 gain $18?

2. If 12 bushels of wheat cost $10, how many bushels can be bought for $15?

3. The sum of two numbers is 25, and the difference is 7. Find the numbers.

4. A man paid $20 more than $\frac{3}{7}$ of his ready money for a cow, and had $80 left. How much did the cow cost?

5. If 35 cu. ft. of hard coal is a ton, how many tons will a bin 7 ft. long, 6 ft. wide, and 10 ft. deep hold?

6. The prime factors of a number are 5, 7, and 13. Find the number.

7. The base of a triangle is 4 in. long. How high must it be to equal in area a square with a side 4 inches?

8. If a barrel of apples cost $3\frac{3}{4}$, how many barrels can be bought for $86\frac{1}{4}$?

9. If a man spends $\frac{3}{8}$ of his salary and has $236 remaining, how much is his salary?

10. If the selling price of an article is $2.75 and the gain is $\frac{1}{10}$ of the cost, find the cost.

EXERCISE 150

1. Divide 87 into two parts, one of which shall be 19 greater than the other.

2. One night a dog killed 17 sheep; this was $5\frac{2}{3}\%$ of the flock. How many of the flock were spared?

3. At what rate per cent. interest will $60 become $69 in $1\frac{1}{2}$ yrs. ?

4. I sc' . cow for $36 and thereby lost 20%. At what price should it have been sold to gain 20% ?

5. If a flagstaff 30 ft. high casts a shadow 20 ft. long, what must be the height of that staff which at the same time casts a shadow 36 ft. long ?

6. A grocer buys goods to the amount of $8000. For how much does he sell them if he realizes 20% profit, allowing 4% of the sales for bad debts ?

7. If $\frac{1}{3}$ of *A*'s money is increased by $\frac{2}{5}$ of his money, the sum is $5500. How much has he ?

8. How far can a man travel at the rate of 8 mi. an hour and return at 6 mi. an hour, to take 7 hours in going and coming ?

9. If the 11 men of a football team weigh together 1 ton 2 lb., find the average weight of a man.

10. How many bushels of potatoes at 75c. a bushel must a farmer give for 36 yd. of carpet at $1.50 a yard ?

EXERCISE 151

1. A widow received 40% of her husband's estate, and her daughter 28% of it. The widow received $3600 more than the daughter. Find each one's share and the value of the estate.

2. How much must be paid for 12 melons if 4 melons are worth 12 peaches, and 5 peaches are worth 15c. ?

3. Find the cost of 84 ft. of garden hose at $8\frac{1}{2}$c. a foot.

4. Find the cost of 2.4 yd. of cloth at $3.5 a yard.

5. How much is a pile of sand 18 ft. long, 15 ft. wide, and 12 ft. deep worth at 25c. a cubic yard?

6. A boy bought a pair of skates for $2 and sold them for $3. He bought them back for $2.75 and sold them again for $2.60. What is his gain or loss?

7. A drover sold cattle at $32 a head at a loss of 20%. Find the cost price.

8. If 28 men can do a work in 30 days, how long will it take 42 men to do it?

9. How many yards of muslin worth 12c. a yard may be bought for 16 lb. of butter worth 27c. a pound?

10. A man divided 30½ lb. of flour among some poor people, giving each 2½ lb. How many persons were there?

EXERCISE 152

1. How far may one go in a car that runs 12 mi. per hour, that he may walk back at the rate of 3 mi. per hour, and be gone just 15 hr.?

2. I had money at interest at 8%; afterwards the rate was reduced to 6%, and my annual interest was $240 less. How much had I at interest?

3. Reduce $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$, and $\frac{5}{6}$ to equivalent fractions with a common denominator.

4. If a lot that cost $450 is sold for $600, find the profit and the gain per cent.

5. Divide the continued product of 24, 25, and 36 by the continued product of 3, 5, 8, and 9.

6. A farmer sows $2\frac{2}{3}$ bu. of grain on an acre. How much will he sow on $2\frac{1}{2}$ acres?

7. A farmer sold 774 bu. of wheat, which was $\frac{9}{13}$ of his crop. How many bushels had he left?

8. If the selling price of an article is $12 and the gain is .25 of the cost, find the cost.

9. The sum of $6.40 is made up of an equal number of 5-cent pieces, 10-cent pieces, and 25-cent pieces. How many of each are there?

10. The sum of $3.90 is made up of twice as many 5-cent pieces and three times as many 10-cent pieces as 25-cent pieces. How many of each are there?

EXERCISE 153

1. Divide $100 into two parts, such that 7 times the first part is equal to 3 times the second.

2. The sum of two numbers is 100 and their difference is 16. Find the numbers.

3. Five men hired a conveyance, but three more joined them, and the expense of each of the five was reduced $1.50. How much did the conveyance cost?

4. How much must an agent collect so that he may pay over $1100 after retaining $8\frac{1}{3}\%$ for collecting?

5. A boy sold two knives at the same price; on one he gained 20% and on the other he lost 20%. He lost 2c. by the transaction. Find the cost price of each.

6. If chickens lose 20% of their weight when dressed for market, how much will 80 lbs. of live chickens weigh when dressed?

7. A boy rode $12\frac{1}{4}$ miles on Monday, $13\frac{3}{8}$ miles on Tuesday, and $15\frac{5}{12}$ miles on Wednesday. How far did he ride during the three days?

8. At $\$\frac{7}{5}$ per yard, find the cost of 155 yd. of ribbon.

9. A grocer paid \$15.12 for prunes at 7c. a pound. How many pounds did he buy?

10. A farmer had 120 head of cattle. He sold 80 of them. What per cent. had he left?

EXERCISE 154

1. What rates per cent. are equivalent to the following fractions of a quantity: $\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{2}{5}$, $\frac{3}{5}$?

2. A watch and chain cost \$45. Find the cost of each if the chain cost $\frac{1}{4}$ of the cost of the watch.

3. If 24% of a case of oranges is bad and 380 oranges are good, how many oranges does the case contain?

4. A bankrupt who can pay only $37\frac{1}{2}$ cents in the dollar owes *A* \$640. How much does *A* lose?

5. A wagon loaded with hay weighed 4000 lbs. The wagon weighed 1600 lb. less than the hay. Find the weight of each.

6. A gallon of water weighs 10 pounds and a cubic foot of water 1000 ounces. How many gallons are there in a cubic foot?

7. How much money must be lent for $\frac{2}{5}$ of a year at 8% per annum that the interest may be \$144?

8. How many sheep worth \$6 each should be given for 28 hogs worth \$9 each?

9. A farmer sells $\frac{2}{3}$ of his lambs to *A*, $\frac{1}{2}$ the remainder to *B*, and has 60 left. How many had he at first?

10. Three-fifths of a pole is painted white; $\frac{2}{3}$ of the remainder is red; the other part is 6 feet long. Find the entire length of the pole.

EXERCISE 155

1. A bankrupt owes $12500 and his estate is worth $5000. How much does he pay in the dollar?

2. What was the cost of a horse sold for $240 at a gain of $33\frac{1}{3}\%$?

3. In a wood $\frac{1}{3}$ of the trees are maples, $\frac{1}{6}$ are spruces, $\frac{1}{4}$ are poplars, and there are 80 birches. How many trees are there altogether?

4. What fraction must be added to $\frac{3}{5}$ of $\frac{1}{2}\frac{0}{5}$ to make 2?

5. A mixture consists of $13\frac{1}{4}\%$ sand, $3\frac{3}{4}\%$ manure, and the rest clay. What per cent. is clay?

6. A poulterer sold 8 less than $\frac{1}{3}$ of his chickens and had 88 left. How many had he at first?

7. If a railway train goes .9 of a mile in a minute, how long does it take to travel 10.8 miles?

8. A ranchman owned 840 cattle in the fall, but the losses during the winter brought the number down to 720 in the spring. What was his loss per cent.?

9. A grocer buys canned fruit at the rate of 15c. a can and sells it at the rate of $4.80 per case of 24 cans. What is his gain per cent.?

10. A man agreed to work for 30 days at $\$2\frac{1}{2}$ per day, but for each day he was idle he was to pay $\$\frac{1}{2}$. At the end of the time he received $45. How many days did he work?

EXERCISE 156

1. A dealer sold a horse for $150 and thereby gained 25%. How much did the horse cost him?

2. Three men own a store. A owns $\frac{3}{8}$ of it, B $1\frac{1}{2}$ of it, and C the rest. C sells his share for \$4500. What is the value of the whole store?

3. The third, fourth, and fifth of a number together amount to 94. What is the number?

4. How many quarter-pound parcels are there in $19\frac{3}{4}$ pounds?

5. At \$26 a ton, what is the cost of 400 lb. of bone meal?

6. What is the average weight of the members of a football team, if the 11 men weigh 1 ton 35 lb.?

7. How much did a grocer pay for a tub of butter that sold for \$15, if it cost 75% of the sum for which it was sold?

8. An acre of land produced 18600 lb. of sugar beets. How many pounds of sugar did these beets contain, if a test showed them to be $16\frac{2}{3}\%$ sugar?

9. The family butcher's bill was \$8 last week, the grocer's bill 25% more, and the baker's bill was 60 ¢ less than the grocer's bill. What was the total of the three bills?

10. A lot 150 ft. by 105 ft. is enclosed by a fence 5 boards high, the boards being the longest possible so that none needed to be cut. How many boards are in the fence?

EXERCISE 157

1. A board $12\frac{2}{3}$ feet long was cut into lengths of $\frac{1}{3}$ of a foot each. How many pieces were there?

2. Which is the greatest, and which the least of the fractions: $\frac{7}{13}$, $\frac{13}{30}$, $\frac{9}{20}$?

3. From a piece of cloth containing 50 yards, $5\frac{3}{8}$ yards were sold to one woman and $11\frac{1}{4}$ yards to another. How many yards remained unsold?

4. If a grocer buys sugar at 5c. a pound, what must he charge for $5\frac{1}{2}$ lb. in order to gain 20% on the cost?

5. The paper used in a club costs $7 a thousand sheets and the envelopes $3 a thousand. Find the cost of sending 100 invitations, each requiring a sheet of paper, an envelope, and a 2-cent stamp.

6. Find the output of a starch factory that uses 1500 bushels of potatoes per day, if the potatoes weigh 60 pounds per bushel and yield 15% of their weight in starch.

7. How many sweet potato plants does it take to yield a barrel of sweet potatoes, if 25 plants yield 25% of a barrel?

8. What must be the marked price of goods which cost $12 in order that the merchant may allow a discount of 25% and still make a profit of 25%?

9. What fraction of 48 is 16? What per cent. is it?

10. The road between two towns is 4 rods wide, and contains 144 acres. How many miles are the towns apart?

EXERCISE 158

1. A man who owned $11\frac{3}{4}$ acres of land sold $7\frac{1}{8}$ acres. How much land had he left?

2. A kettle of water loses 25% of its contents in boiling and then has $1\frac{1}{2}$ quarts less than it had at first. How much did it contain at first?

3. During April Mr. Stock's 30 cows produced 18900 pounds of milk. Find the average number of pounds of milk produced by 1 cow in 1 day.

4. If the income from an acre of strawberries was $550 and the cost of production was $220, what per cent. of the income was the cost?

5. A rice grower in South Carolina sowed 450 bu. of rice seed at $2\frac{1}{2}$ bushels per acre. How many acres did he sow?

6. A drover bought 30 animals, consisting of sheep and lambs, for all of which he paid $160. The sheep cost $6 apiece and the lambs $2 each. How many of each were there?

7. One pipe can fill a cistern in 4 hr. and another can fill it in 6 hr. If the cistern is empty and both pipes are opened at the same time, in what time will it be filled?

8. *A* sold to *B* $\frac{4}{5}$ of his land, and then bought back $\frac{2}{5}$ of what he had sold. What part of the land did each own then?

9. During one month Mr. Jones burned 2500 cu. ft. of gas in his house, and the next month 2400 cu. ft. What was the per cent. of decrease?

10. A stenographer rented a typewriting machine at $1.25 a week and kept it from April 3 to June 12. How much rent did she pay?

EXERCISE 159

1. Find the weight of a bale of sponges from the Bahama Islands, if the covering weighs 3 lbs., or 4% of the total weight.

2. A grade of wheat yields 75% of its weight in flour. Find the number of bushels of wheat to make 3600 lb. of flour.

3. How far may a man ride in an automobile at the rate of $12\frac{1}{2}$ mi. per hour and walk back at the rate of 5 mi. per hour, and be gone 3 hr.?

4. Two men hired a pasture for $24. *A* put in 12 horses, and *B* 20 horses. How much should each pay?

5. How much will it cost to paint a cylindrical pillar $4\frac{1}{2}$ ft. in circumference and 18 ft. high, at 25c. per square yard?

6. A man can mow $\frac{2}{3}$ of a field in $3\frac{3}{5}$ hr. How long will it take to mow the whole field at this rate?

7. If 8 men can do a piece of work in 6 days, in what time can 12 men working at the same rate do this work?

8. What is the shortest distance you can measure with a stick 3 ft. long, or with one 6 ft. long, or with one 9 ft. long?

9. What is the list price of goods which cost $24 after the discount of 25% had been deducted?

10. A lady bought 30 yd. of cloth for $25, part at 75c. a yard and the rest at $1 a yard. How many yards of each kind did she buy?

EXERCISE 160

1. If a man can do $\frac{3}{4}$ of a piece of work in 15 days, in what time can 4 men do the entire work?

2. A steamboat has two smoke stacks, each 7 ft. in diameter and 30 ft. high. How much will it cost to paint them at 30c. per square yard?

3. What is the depth of a block of marble 4 ft. long and $2\frac{1}{2}$ ft. wide that weighs as much as a block $4\frac{1}{2}$ ft. by 3 ft. by 2 ft.?

4. At what distance from the end must a piece of timber $1\frac{1}{3}$ ft. square be sawed so as to cut off 24 cu. ft.?

5. What is the number that multiplied by 60% of itself gives a product 60?

6. A sample of coal was found to contain 75% of carbon. How much carbon is there in a ton of such coal?

7. A man who earns $250 a month puts 30% of it in the savings bank. How much does he put in the bank in a year?

8. A man went away from home on an automobile at the rate of 20 miles an hour, and walked back at the rate of 4 mi. per hour. If he was gone just 6 hr., how far did he go?

9. Divide 225 into parts proportional to 2, 3, and 4.

10. If the interest on a sum of money for 6 mo. is $45, what will be the interest on the same sum at the same rate for 8 mo.?

EXERCISE 161

1. Simplify $8+3(8-4)\div 2$.

2. Find the value of $16\div 2+4(9-3)\div 2-3\times 3$.

3. The prime factors of a number are 2, 3, 5, 7 and 7. Find the number.

4. When eggs are worth 24c. a dozen, how many dozen eggs will pay for 18 lb. of tea at 40c. a pound?

5. The earth from a rectangular excavation 40 ft. by 36 ft. by 12 ft. was spread over a lot 120 ft. by 72 ft. How deep was the earth?

6. Express 84 as elevenths and 58 as ninths.

7. A factory is lighted by 60 electric incandescent lamps. If each lamp burns 800 hr. per year at a cost of ½c. per hour, how much does it cost to light the factory per year?

8. How many rubber erasers 3 in. long, ½ in. wide, and ½ in. thick can be cut from a cubic foot of rubber?

9. The iron ore, red hematite, contains about 70% of iron. How many pounds of iron can be obtained from 1½ tons of red hematite?

10. What per cent. is gained by buying an article at 10% below market value and selling it at 10% above?

EXERCISE 162

1. Express .625 as a vulgar fraction in its simplest form.

2. If the annual yield from a rubber tree is 7½ lb. of rubber, what is the yield from 36 trees?

3. The Simplon tunnel between Italy and Switzerland is 12¼ mi. long. If ⅕ of its length is in Italian territory, how many miles are in each country?

4. If 12½ yd. of silk cost $15, find the cost of 20 yd.

5. Two granite blocks are of the same weight. One is 8 ft. by 4 ft. by 3 ft.; the other is 6 ft. by 4 ft. Find the third dimension of the latter.

6. A steamship sailed from Liverpool at 9 a.m. on Thursday morning and reached Quebec at 11 a.m. on the following Monday week. How long did the passage last?

7. In a square mile there are 640 acres. How many acres are there in a field ¾ mi. long and ½ mi. wide?

8. Lake Erie has an area of nearly 10000 sq. miles. This is about 32% of the area of Lake Superior. Find the area of Lake Superior.

9. An agent collected 75% of a debt of $400 and charged 12½% commission. Find his commission.

10. What single discount is equivalent to two successive discounts of 25% and 20%?

EXERCISE 163

1. Find the sum of $\frac{5}{8}$, $\frac{5}{8}$, and $\frac{5}{12}$.

2. From $\frac{5}{6}$ of 1080 take $\frac{3}{8}$ of 1080.

3. The distance between Paris and Calais is 184½ mi. Passenger trains travel this distance in 3 hr. Find their rate per hour.

4. If a machine makes 280 grape baskets in $\frac{2}{3}$ of an hour, how many baskets does it make in $3\frac{1}{3}$ hr.?

5. At a zoological garden the animals eat 350 lb. of beef per day. Find the cost at $8 per 100 lb.

6. A man changed a 5-pound note and 3 half-sovereigns for shillings. How many shillings did he receive?

7. Vancouver is in longitude 128° and Lloydminster in 110°. Find the difference of their sun times.

8. Before the war with Japan the tonnage of the Russian navy was 450000 tons. After the war it was 225000 tons. Find the per cent. of decrease.

9. How much did a commission merchant receive for selling 1200 baskets of peaches at $1.10 on a commission of 5%?

10. In a certain town the tax rate is 20 mills in the dollar. Find *A*'s tax whose property is assessed for $5600.

EXERCISE 164

1. Find a single fraction equivalent to $20\frac{3}{4} + 43\frac{5}{8} + 60\frac{1}{16}$.

2. Find the value of $\frac{1}{3}$ of $65 + \frac{2}{5}$ of 75.

3. A steam shovel removed $45\frac{1}{2}$ cu. yd. of earth in 7 min. How much did it remove per minute?

4. A contractor with 80 laborers can complete a piece of work in 30 days. If he can get only 50 laborers, how long will he require to complete the work?

5. Find the value of a shipment of peaches consisting of 2240 baskets at $1.25 per basket.

6. A wagon loaded with coal weighed 4200 lb. The coal weighed 1800 lb. more than the wagon. How much did the wagon weigh?

7. A body immersed in water is buoyed up by a force equal to the weight of water it displaces. How much less will a stone 5 ft. by 4 ft. by 1 ft. weigh in water than in air, a cubic foot of water weighing $62\frac{1}{2}$ lb.?

8. An orange tree yielded 50% more oranges the second time it bore than the first time. If the second crop amounted to 360 oranges, how many were there in the first crop?

9. Find the net price of an automobile listed at $2400, the discounts being 25% and 10%.

10. Find the specific duty on a carload of melons consisting of 60 boxes, each box containing 15 melons at $2\frac{1}{2}$c. each.

EXERCISE 165

1. If the product of three numbers is 540 and the product of two of them is 15, what is the third number?

2. Find the product of 65 and 60, and of 36 and 25.

3. A bookkeeper received $75 per month for his services. He spent $650 in the year. How much did he save?

4. Divide $4 \times 5 \times 7 \times 9$ by $2 \times 3 \times 7$.

5. A lady bought 12 yards of ribbon at 48c. a yard, but exchanged it for other ribbon at 32c. per yard. How many yards did she get?

6. The sum of two numbers is $74\frac{3}{5}$. One of the numbers is $28\frac{1}{5}$. What is the other number?

7. There are $16\frac{1}{2}$ ft. in a rod. How many feet are there in 4 rod? in $3\frac{1}{2}$ rod?

8. If a locomotive run $171\frac{3}{4}$ mi. in 6 hr., what is its average rate per hour?

9. At $\$1\frac{2}{3}$ a basket, how many baskets of peaches can be bought for $\$16\frac{1}{2}$?

10. The product of two numbers is 12. One of them is $2\frac{2}{7}$. Find the other.

EXERCISE 166

1. Find the result of 341×80, and of 264×90.

2. How many pencils are there in 15 gross, there being 12 dozen in a gross?

3. How many fathoms deep is the ocean when it is 15840 ft. deep? A fathom is 6 feet long.

4. Two men set out from the same place and travel in opposite directions, one at the rate of 30 mi. a day, and the other at the rate of 25 mi. per day. How far will they be apart at the end of 16 days?

5. Reduce $\frac{9}{18}\frac{8}{8}$ and $\frac{1}{3}\frac{9}{9}\frac{9}{9}$ to equivalent fractions in their simplest form.

6. A good walker can walk $4\frac{1}{2}$ mi. per hour. At this rate, how far can he walk in 10 hr.?

7. At an auction sale a cow was sold for $\$28\frac{1}{2}$, and a horse for $2\frac{1}{2}$ times as much. For how much was the horse sold?

8. A field containing $291\frac{1}{3}$ sq. rd. was divided into 8 equal lots. How large were the lots?

9. How many times can a can holding $1\frac{3}{4}$ gal. of oil be filled from a cask holding $61\frac{1}{4}$ gal.?

10. A man forgot how many bushels of wheat he had sold, but he remembered that he had received $294 for the wheat at $\$1\frac{1}{5}$ a bushel. How many bushels did he sell?

EXERCISE 167

1. How much is 84×80 and 65×65?

2. If your pulse beats 72 times in a minute, how often does it beat in an hour?

3. Two men set out from the same place and travelled in the same direction, one at 20 mi. an hour and the other at 15 mi. In how many hours will they be 85 miles apart?

4. The divisor is 16, the quotient is 35, and the remainder is 12. Find the dividend.

5. A farmer sold a load of hay for $\$9\frac{3}{4}$ and a load of oats for $\$23\frac{3}{5}$. For how much did he sell both loads?

6. There are $16\frac{1}{2}$ ft. in a rod. How many feet are there in 9 rods?

7. If a square foot of land is worth $\$\frac{1}{4}$, what is a lot 36 ft. by 160 ft. worth?

8. A boot and shoe dealer bought boots at $2\frac{1}{2}$ a pair, paying $90. How many pair did he buy?

9. A gardener set out some cabbage plants, but grubs cut off all but 80, which was $\frac{2}{3}$ of the number set out. How many did he set out?

10. The wages of two men are $2\frac{1}{4}$ and $2\frac{1}{3}$ respectively, per day. In how many days will the sum of their wages be $55?

EXERCISE 168

1. Simplify $68 \times 40 + 45 \times 20$.

2. How many bricks are there in 8 loads, each containing 1450?

3. A gasoline launch ran up a river for 6 hr. at the rate of 10 mi. per hour and returned in 4 hr. What was its rate per hour in coming down?

4. If 12 barrels of flour are worth $96, what will 45 bbl. cost?

5. A school room is $32\frac{3}{4}$ ft. long and $24\frac{1}{2}$ ft. wide. Find the perimeter of the room.

6. If a railway train goes $25\frac{3}{5}$ mi. per hour, how far will it go in 12 hr.?

7. A boy divided $6\frac{1}{4}$ dozen marbles equally among 5 little girls. How many marbles did he give to each?

8. How often does $36\frac{1}{4}$ contain $1\frac{1}{4}$?

9. After purchasing a silver watch for $18\frac{3}{4}$, I had $25\frac{3}{5}$ left. How much money had I at first?

10. It takes A and B together 6 days to do a piece of work which B alone can do in 9 days. In what time can A do the work?

EXERCISE 169

1. Simplify $(36 \times 5 - 24 \times 6) \div 3$.

2. There are 5280 ft. in a mile. How many feet does a man go in walking 5 miles?

3. The product of two factors is 5625, and one of them is 75. Find the other.

4. How many times will a cart wheel 15 ft. in circumference revolve in going a mile?

5. A flagstaff 50 ft. high was broken off by a storm so that it measured $37\frac{5}{8}$ ft. How much was broken off?

6. A certain fast express averages 54 mi. per hour. How far will it go in $4\frac{1}{3}$ hr.?

7. An estate of $\$4633\frac{1}{3}$ was divided equally among 5 heirs. How much did each receive?

8. How many plows at $\$11\frac{3}{8}$ each can be bought for $\$81\frac{1}{2}$?

9. A cow was sold at an auction sale for $36. This was $\frac{3}{8}$ of what a horse was sold for. How much did both bring?

10. A man spent $\frac{1}{5}$ of his money and $5 more. He then had $23. How much had he at first?

EXERCISE 170

1. If $\frac{1}{2}$ of a yard of cloth costs $\$\frac{3}{5}$, what will $\frac{7}{8}$ of a yard cost?

2. If it takes $7\frac{1}{2}$ bu. to sow $4\frac{1}{2}$ a. of land, how many bushels are needed to sow 18 a.?

3. If 3 men can do a work in 10 days, how many men can do 4 times as much work in $\frac{1}{5}$ of the time?

4. Two men together earn $48 in a certain time. How much should each receive, if they are paid at the rate of $1\frac{1}{2}$ and $2\frac{1}{2}$ a day respectively?

5. If the premium paid for a policy of insurance is $4.50 and the rate is 75c. per $100, what is the face of the policy?

6. An average spruce tree yields wood enough for 500 lb. of paper. How many spruce trees are required for a newspaper that uses 2,000,000 lb. of paper each year?

7. A farmer bought 2 robes for his cutter at $15 apiece, and paid for them with wood at $3\frac{3}{4}$ a cord. How many cords did it take?

8. The yearly premium of insurance on a house insured for $\frac{2}{3}$ of its value at $\frac{3}{4}\%$ is $9. Find the value of the house.

9. A merchant who sold goods at an average gain of $12\frac{1}{2}\%$ made a profit of $7500 in a year. Find the amount of his sales during the year.

10. By selling cloth at 36c. a yard, I gained $\frac{2}{7}$ of the cost. Find my gain on 40 yards.

EXERCISE 171

1. What number added to 4 times $\frac{5}{7}$ of 35 will make 120?

2. A bushel of wheat costs 20c. more than a bushel of rye, and a bushel of each cost together $1.60. How much does a bushel of each cost?

3. Separate $540 into parts proportional to 3, 5, and 10.

4. A grain elevator has a bin 5 ft. square and 80 ft. deep. How many bushels will it hold, allowing $1\frac{1}{4}$ cu. ft. to the bushel?

5. The sides of a triangle are in the proportion of 4, 5, 6, and the sum of the sides is 60 inches. Find the length of each side.

6. A grocer paid $240 for a quantity of tea. He sold part of it for $12 at 50c. a pound, by which price he gained $4.80 on what he sold. How many pounds did he buy?

7. A lawyer collected a note of $540 and charged 5% for collecting it. How much did he remit to the owner of the note?

8. A refrigerator car costs about $800. Reckoning interest at 4%, depreciation at 8%, repairs at 5%, and general expenses at $5, find the annual cost of operating a car.

9. The wholesale grocer buys coffee at 25c. per pound and sells it at 30c. The retail grocer buys it at 30c. and sells it at 37½c. What per cent. does each make?

10. Thomas has 25% more money than James. What per cent. less has James than Thomas?

EXERCISE 172

1. Eighty-four is $\frac{7}{9}$ of how many times 27?

2. A boy can hoe a row of turnips in $\frac{3}{8}$ of 1 hr. 4 min. How much can he earn in 6 hr. at 10c. a row?

3. Find the area of a triangle whose base is 30 ft. and the perpendicular on it from the opposite angle is 24 ft.

4. The cost of drilling a salt well at $\$\frac{7}{8}$ per foot was $1470. How deep was the well?

5. How many yards of sheeting at 16¼c. per yard can be bought for $13?

6. The freight charges of two railways on a train load of grain were $1080. One carried the grain 400 miles, and the other 500 miles. Find the sum apportioned to each road.

7. In a certain town the rate of taxation is 15 mills on the dollar. The assessment being 40% of the true value, find *A*'s tax, who has property worth $60000.

8. A lady bought 60 boxes of strawberries, part at 12c. a box and part at 15c. a box. The total cost was $7.80. How many boxes of each kind were bought?

9. A merchant tailor bought cloth at a discount of 30% and retailed it at the list price. How much per cent. profit did he make?

EXERCISE 173

1. What part of $8\frac{1}{3}$ is $6\frac{2}{3}$?

2. The strawberries grown on $4\frac{1}{2}$ a. of land were sold for $2025. The expenses of tillage, picking, etc., came to $900. What was the net income per acre?

3. A clerk whose salary was increased 20% now has $1320. What was his former salary?

4. Find the area of a trapezoid whose parallel sides are respectively 26 ft. and 34 ft. long, and the perpendicular distance between is 12 ft.

5. Out of a tank that is $\frac{3}{4}$ full, 210 gallons are pumped and then the tank is $\frac{2}{5}$ full. How many gallons does the tank hold?

6. One contractor has 6 men on a piece of work for 6 days, and another has on the same work 6 men for 4 days. They receive $120 for the work. How much belongs to each contractor?

7. A manufacturing plant turns out 6400 concrete building blocks in 8 days. How large an order for concrete blocks can it fill in 20 days?

8. When a man trades 42 bbl. of flour at $8 per barrel for coal at $6 per ton, how many tons of coal does he get?

9. A house rents for $450 a year; this represents 6% of its value. How much is it worth?

10. A man bequeathed to a college enough money so that the interest on it at 4% would provide 6 annual scholarships of $250 each. Find the amount of the endowment.

EXERCISE 174

1. John walked $2\frac{1}{2}$ mi. in $\frac{3}{4}$ of an hour. At this rate, how long will it take him to walk $2\frac{3}{5}$ mi.?

2. A man's gas metre registered 32470 cu. ft. on April 1st and 38270 cu. ft. on July 1st. Find the cost of the gas for the quarter at 90c. per 1000 cu. ft.

3. A post 6 ft. high casts a shadow 4 ft. long, and at the same time a tree standing beside the post casts a shadow 60 ft. long. How high is the tree?

4. How many board feet are there in a squared log 36 ft. long, 10 inches wide, and 8 inches thick?

5. A girl's school garden is 10 ft. long and 8 ft. wide. She planted flowers along the border 6 in. apart. How many were round her plot?

6. One drover had 9 horses, and another 8. A farmer charged them $25\frac{1}{2}$ for keeping the animals. How much should each drover pay?

7. A drover bought some lambs at $5 each and had $70 left. If he had bought as many hogs at $8 each he would have had only $10 left. How many lambs did he buy?

8. A young man worked a year at $35 a month. He paid $15 a month for his board, and his other expenses were $100. How much did he save in a year?

9. Divide $180 between two boys in the proportion of $\frac{1}{3}$ to $\frac{1}{4}$.

10. A miller instructed his agent to buy him 5000 bu. of wheat at 80c. If the agent charges 3% commission, and freight, drayage, and insurance charges are $125, find the total cost of the wheat.

EXERCISE 175

1. If a cord of wood costs $4\frac{1}{4}$, find the cost of 13 cords.

2. To level a lawn required $43\frac{1}{2}$ cu. yd. of earth. How many loads were there of $1\frac{1}{2}$ cu. yd. each?

3. If my watch gains $\frac{1}{6}$ of a min. in $1\frac{1}{2}$ days, in how many days will it gain $1\frac{1}{3}$ min.?

4. One side of a rectangular lot containing 3 a. is 30 rods long. How long is the adjacent side?

5. I divided 65 apples among 4 girls and 5 boys, giving each girl twice as many as to each boy. How many did each get?

6. A pole 51 ft. long is broken by the wind; $\frac{2}{3}$ of the length of the longer piece is equal to $\frac{3}{4}$ of the length of the shorter. Find the length of each.

7. If a bushel is $1\frac{2}{7}$ cu. ft., how many bushels will a bin hold that is 10 ft. by 9 ft. by 6 ft.?

8. Find the cost of $5\frac{1}{2}$ lb. of butter at 26c. per pound.

9. The larger of two numbers is 60, and their difference is 35. Find their product.

10. A house and lot costs $2500 and rents for $25 a month. If taxes, insurance, and repairs cost $75 a year, what rate of interest is earned on the investment?

EXERCISE 176

1. A man can do a piece of work in 20 hr. and a boy can do it in 40 hr. If they work together from the first, in what time will the work be done?

2. Divide $270 among three men in proportion to 5, 6, 7.

3. A brick is 8 in. long, 4 in. wide, and 2 in. thick. How many bricks are there in a pile 16 ft. long, 4 ft. wide, and 2 ft. deep?

4. The product of two numbers is 42, and one of them is $2\frac{1}{3}$. What is the other?

5. A ship's clock is corrected every day at 1 p.m. How much must it be put forward at 1, if the ship has passed over 12° of longitude from west to east?

6. A house valued at $9000 is insured for $\frac{2}{3}$ of its value. The premium is $45 a year. Find the rate of insurance.

7. In a certain municipality the rate of taxation is 20 mills in the dollar. Find the taxes of a man who owns 150 a. of land worth $50 an acre and assessed at $\frac{3}{5}$ of its value.

8. If 6 barrels of cabbage can be bought for $7\frac{1}{2}$, how many barrels can be bought for $10?

9. Two towns, A and B, are 45 mi. apart. A person sets out from A to walk to B at the rate of 3 mi. an hour, and two hours later, another sets out from B to walk to A at the rate of $3\frac{1}{2}$ miles an hour. How far from A will they meet?

10. The product of the perpendicular on the hypothenuse and the hypothenuse is equal to the product of the other two sides of any right-angled triangle. Find the length of the perpendicular upon the hypothenuse of a right-angled triangle whose sides are 5, 12 and 13 in. respectively.

EXERCISE 177

1. The product of two numbers is 51, and one of them is $3\frac{3}{5}$. What is the other?

2. The difference between $\frac{5}{8}$ of a number and $\frac{3}{4}$ of the same number is 15. Find the number.

3. Find the cost of 2800 lb. of hay at $15 a ton.

4. How many bushels of apples can be bought for $\$60\frac{3}{4}$ at the rate of $\$2\frac{1}{4}$ per bushel?

5. The latitude of Banff is 51° 10′ and of Toronto 43° 40′. Allowing 70 mi. for a degree, how many miles is Banff north of Toronto?

6. On a lot 30 ft. by 120 ft. a house was built 25 ft. by 32 ft. How much of the lot was unoccupied by the building?

7. Lead weighs $11\frac{2}{5}$ times and platinum 21 times as much as an equal bulk of water. Find the weight of a piece of platinum equal in bulk to a piece of lead weighing 114 lb.

8. A farmer by skilful cultivation and careful selection of seed raised 375 bu. of wheat from $8\frac{1}{3}$ a. of land. How many bushels per acre was that?

9. If the interest on $450 is $27 in a given time, how much is the interest on $850 for the same time and rate?

10. How many cords of wood can be stored in a shed 16 ft. long, 12 ft. wide, and 8 ft. high?

EXERCISE 178

1. Reduce $\frac{8}{32}\frac{1}{0}\frac{0}{4}$ to its lowest terms, and $\frac{1}{1}\frac{2}{6}\frac{6}{6}$ to a mixed number.

2. In a mile there are 320 rods and each rod is $5\frac{1}{2}$ yd. long. How many yards are there in a mile?

3. If a man can cut $15\frac{3}{4}$ cords of wood in 7 da., how many cords can he cut in 1 da.?

4. A number is divided into three parts which are proportional to 1, 3, 5. The second part being 12, find the number.

5. How far may I sail in one steamer going at the rate of 15 mi. an hour, so that returning at the rate of 12 mi. an hour I may be gone just 9 hr.?

6. To build a fence $\frac{3}{7}$ of a mile long costs $40 less than if it had been $\frac{5}{8}$ of a mile long. How much did the fence cost?

7. Find the value of a pile of cordwood 80 ft. long and 8 ft. high at $4 a cord.

8. A man wishes to insure his life for an amount that invested at 4% will provide an annual income of $2400 after his death. For what sum must his life be insured?

9. I have two lots, one 144 ft. long and 64 ft. wide, the other a square equal in area to the oblong lot. How long is the side of the square lot?

10. A floating body displaces as much water as is equal to its own weight. A boat displaces 12 cu. ft. of water. Find the weight of the boat, a cubic foot of water weighing $62\frac{1}{2}$ lb.

EXERCISE 179

1. The sum of two numbers is $20\frac{3}{8}$ and one of them is $6\frac{1}{4}$. Find the other.

2. Find the area of a circular table 22 ft. in circumference.

3. From a bin containing $96\frac{3}{4}$ bu. of wheat, $58\frac{5}{8}$ bu. were sold. How many bushels remained?

4. A drover sold cattle at $27.50 per head, at a gain of 25% on the cost price. Find the cost price.

5. A farmer exchanged 75 bu. of wheat at 80c. a bushel for cloth at 60c. a yard. How many yards did he get?

6. Two geese weigh $9\frac{5}{8}$ and $12\frac{7}{16}$ lbs. respectively. Find their combined cost at 20c. a pound.

7. What must be the height of a room 15 ft. long and 12 ft. wide that the area of the walls may be 72 sq. yd.?

8. What must a merchant ask for cloth that cost $1.44 per yard, so that he may take 10% off the asking price and still make 25% profit?

9. A man's board was 75c. a day and his wages $2.25. At the end of 40 days he had $45. How many days was he idle?

10. On a certain map 8 miles of country are represented by $\frac{1}{2}$ inch. What area of country will be represented by 1 sq. in. on the map?

11. How many strips of carpet $2\frac{1}{4}$ ft. wide will be needed to carpet a room 18 ft. wide? If each strip is 8 yd. long, how many yards will be needed?

EXERCISE 180

1. If a barrel of apples costs $3\frac{1}{2}$, how many barrels can be bought for $45\frac{1}{2}$?

2. The sum of two numbers is 24, their difference is 6. Find the numbers.

3. Divide $180 into 3 parts which shall be to one another as 3, 4, and 5.

4. If the premium on a policy for $3800 is $30.40, what is the rate in cents per $100?

5. A merry-go-round has two rows of seats. One row is $10\frac{1}{2}$ ft. from the centre and the other 14 ft. from the centre. How much farther does one seated on the outer row ride than one on the inner row each revolution?

6. The longitude of Edmonton is 113° 30′ W.; that of Stratford, Ont., is 81° W. Find the difference in their sun times.

7. A field of potatoes can be hoed by 8 boys in 4 days. After all work for 2 days, six of the boys leave. How long will it take the remaining boys to finish?

8. On a sugar plantation 4000 tons of sugar cane were grown. The juice extracted was 75% of the weight of the cane and contained $13\frac{1}{3}$% of sugar. How many tons of sugar did the juice contain?

9. Divide the continued product of 9, 7, 16, and 16 by the continued product of 21, 32, and 2.

10. What was the cost of an article that was sold for $84 at a gain of $\frac{1}{5}$ of the cost?

11. How many cubic feet are there in a cement walk 36 ft. long, 6 ft. wide, and $1\frac{1}{3}$ ft. deep?

Agricultural

EXERCISE 181

1. A steer weighing 1500 lb. yielded 900 lb. of dressed beef. What per cent. of its weight was beef?

2. If a woodpecker eats on an average 1650 insect pests a day, how many will 2 woodpeckers eat during the month of June?

3. Of the food of blackbirds nearly 60% is the seed of weeds. When these birds have eaten 25 lb. of other food, how many pounds of weed seed have they eaten?

4. Out of 25 lb. of food eaten by orioles, 4 lb. consists of vegetable food and the remainder of insects injurious to plant life. What per cent. of the food of orioles consists of insects injurious to plants?

5. It is estimated that in one day a chickadee will destroy 30 cankerworms which develop into female moths if not killed. If each moth lays 190 eggs, the chickadee becomes responsible for the destruction of how many cankerworms during a day?

6. If a tree-sparrow eats $\frac{1}{4}$ oz. of the seed of weeds in a day, how many pounds of weed seed will 160 sparrows eat in a day?

7. Of the food of bobolinks 63% is insects. How much insect food is consumed by them while eating 25 lb. of food?

8. Practically 90% of the food of the king-bird is animal food. Find the weight of insects destroyed by it in eating 5 lb. of food.

9. A farmer raised 1250 bu. of tomatoes. These were picked into baskets each holding $\frac{5}{8}$ bu. What did the picking cost at $2\frac{1}{2}$c. per basket?

10. A factory produced 250000 lb. of cheese and 35000 lb. of butter in one year. The cheese was sold for 12c. a pound and the butter for 20c. a pound. How much was received for the output during the year?

EXERCISE 182

1. If bone meal is 4% nitrogen, how many pounds of nitrogen are there in a ton of it?

2. In a certain month a cow gave 875 lb. of milk. The milk tested 4% butter fat. How many pounds of butter fat did this cow produce in this month?

3. By properly selecting his seeds for three years, a farmer finally grew 75 bushels of corn on an acre where formerly he could grow only 40 bu. How much per cent. did he increase his crop of corn?

4. Bordeaux mixture contains by weight $1\frac{1}{4}\%$ of copper sulphate, $1\frac{1}{4}\%$ of unslacked lime, and the rest water. How many pounds of each are there in 600 lb. of the mixture?

5. At $125 a ton, what is the price of 8 lb. of copper sulphate?

6. A dairy farm produces milk that averages $3\frac{3}{4}\%$ of butter fat. If the butter fat during a certain week weighs 240 lb., how much milk did the cows produce during that week?

7. At a creamery on a certain day 2500 lb. of milk were delivered. If $16\frac{2}{3}\%$ of the milk was cream, how many pounds of cream were received that day?

8. If the butter fat is sufficient for 116⅔% of its weight in butter, how many pounds of butter can be produced from 150 lb. of butter fat?

9. A fruit farmer used 300 lb. of bone meal per acre for his grapes. If he had 5 a. in grapes, how much did the bone meal cost him at $28 per ton?

10. An average wheat crop removes 32 lb. of plant food a year from each acre in crop. What is the weight of plant food removed by an average wheat crop from a quarter-section of wheat?

EXERCISE 183

1. A bushel of wheat takes 20 oz. of nitrogen, 8 oz. of phosphoric acid, and 5 oz. of potash out of the soil. How many pounds of these necessary ingredients are taken out of one acre yielding 20 bushels?

2. A ton of clover hay has 40 lb. of nitrogen in it, 10 lb. of phosphoric acid, and 40 lb. of potash. Find the quantity of each of these important ingredients in a crop of 3½ tons to the acre.

3. If a cubic foot of soil weighs 75 lb. and this soil is cultivated to a depth of 4 in., find the weight of cultivated soil on a square yard.

4. In a ton of barnyard manure there are 10 lb. of nitrogen, 6 lb. of phosphoric acid, and 9 lb. of potash. If a load of barnyard manure weighs a ton and 15 loads are spread on an acre, how much of each fertilizing substance is supplied to an acre?

5. Milk has 8 oz. of nitrogen, 2 oz. of phosphoric acid, and 3 oz. of potash in every 100 pounds. How many pounds of each of these fertilizers are there in a ton of milk?

6. In each 100 pounds of the weight of cattle there are 4 oz. of nitrogen, 29 oz. phosphoric acid, and 3 oz. potash. Suppose a farmer sells 8 head of cattle of an average weight of 1000 lb., how many pounds of each of these fertilizers does he sell?

7. It costs 20c. a rod to dig a drain and lay the tiles. The tiles are a foot long and cost 4c. each. Find the cost of making a drain 4 rods long.

8. If 5 in. tiles cost 5c. each and are a foot long, find the cost of tiles for drains aggregating 10 rods.

9. The cost of 25 gal. of Bordeaux mixture for spraying is about 35c. Find the cost of spraying an acre of potatoes, it requiring 200 gal. of the mixture.

10. It costs about 50c. for sufficient formaldehyde to make a solution to destroy the smut germs on 40 bu. of seed wheat. If 2 bu. are sown on an acre, find the cost of treating the seed for 200 acres.

Telegraphing and Telephoning

EXERCISE 184

1. A cablegram to London, England, costs 25c. a word. Find the cost of a cablegram of 27 words.

2. The day rate for telegraphing between Toronto and Vancouver is $1 for 10 words and 7c. for each additional word. Find the cost of a telegram of 17 words.

3. The night rate for telegraphing from Toronto to Vancouver is 75c. for 10 words and 5c. for each additional word. Find the difference in the cost of 28 words sent by night and by day.

4. The rate for using the long-distance telephone between Toronto and Montreal for a three minutes' conversation by day is $2, and 50c. for each additional three minutes or part thereof. Find the cost of a conversation from 8.57 a.m. to 9.05 a.m. between Toronto and Montreal.

5. To send a telegram to Winnipeg from Toronto by day costs 75c. for 10 words and 5c. for each additional word, or by night 50c. for 10 words and 3c. for each additional word. Find the difference between the day and night rates on 37 words.

6. A gentleman in Toronto conversed with another in Montreal from 10.57 to 11.08 at night. How much did it cost him, the night rates being $1 for the first 3 min. and 30c. for each additional 3 min. or a part of it?

7. A message of 47 words was received from Liverpool, England. Find the cost to the sender, the rate being a shilling a word.

8. Find the cost of a telegram of 42 words to Halifax, night rate 25c. for first 10 words and 1c. for each additional word.

9. How much will a conversation for 7 min. between Toronto and Windsor, Ont., cost at $1.10 for the first 3 min. and 30c. for each additional 3 min. or part thereof?

10. Find the cost of a telegram of 137 words to London, Ont., at 25c. for the first 10 words and 1c. for each additional word.

11. Find the cost of a conversation for 10 min. between Toronto and Windsor at night, the rate being 55c. for the first 3 min., and 15c. for each additional 3 min. or part thereof.

TEMPERATURE

EXERCISE 185

1. During a day the temperature fell from 36° at noon to −4° at 10 p.m. Find the fall in temperature.

2. At 6 a.m. the temperature was −5° and at 10 a.m. it was 12° Find the rise in temperature.

3. Water freezes at 32° F. How far below the freezing point of water is −16° F.?

4. When the temperature is 12° F. below zero, how much must it rise before ice begins to melt?

5. Blood heat is about 98° F. What is the difference between this temperature and that of melting ice?

6. In the province of Ontario the average temperature of February is 17.4° F. and of July 67.9° F. What is the difference of the averages for these months?

7. Milk is pasteurized by heating it to 155° F. and keeping it at that temperature for a certain time. How much is this below 212° F., the boiling point of water?

8. During the ascent of a mountain the temperature fell from 56° F. to 26° F. How many degrees did it fall?

9. Olive oil freezes at 30° F. and mercury at −37.9° F. How many degrees is the freezing point of olive oil higher than that of mercury?

10. During a certain week the lowest daily temperatures registered were: −6°, 8°, 10°, −7°, −3°, 4°, 1°. What is the average of these readings?

11. In 1906 at Winnipeg the maximum temperature for the three summer months was 63.7, 66.9 and 65.1. Find the mean maximum temperature for these three months.

Longitude and Time

EXERCISE 186

1. When it is noon by the sun at Winnipeg, what is the time at a place 32° east of it?

2. When it is midnight at Greenwich, what is the time by the sun at a place 63° west of Greenwich?

3. Two places are 56° of longitude apart. What is the difference between their sun times?

4. When it is 7 a.m. at Ottawa, what time is it at a place 10° 30′ east of Ottawa?

5. What is the difference in time between a place in longitude 75° W. and another in longitude 85° 30′ W.?

6. A place is 10° east of the first meridian; another is 75° west of this meridian. Find the difference in their sun times.

7. When it is 1.30 p.m. at Toronto, what time is it by the sun at Winnipeg, 17° 45′ west of Toronto?

8. The difference in time between two places is 30 minutes. The eastern place is in longitude 50° W. What is the longitude of the other place?

9. The difference in time between two places being 3 hr. 40 min. and the western place being in longitude 10° W., what is the longitude of the other?

10. The longitude of a place is 50° E., and of another 20° 20′ W. Find the difference in their local times.

11. When it is 3.30 p.m. by the sun at Winnipeg, what is the time by the sun of a place 33° of longitude east of Winnipeg?